Issue 151 | Fall 2025

BLUEPRINT

CALIFORNIA ENERGY COMMISSION
EFFICIENCY DIVISION

In This Issue

The CEC welcomes feedback on Blueprint. Please contact the editor at **Title24@energy.ca.gov**

2025 Energy Code: Nonresidential Summary of Changes

The 2025 Energy Code adds new requirements for heat pump water heater (HPWH) installations in newly constructed buildings, including ventilation and pipe insulation. It also sets a new heat pump baseline for multizone space-conditioning systems serving office and school buildings under the prescriptive requirements. Other updates include increasing envelope efficiency, improved calculation methods for solar photovoltaic (PV) and battery energy storage system (BESS), expanded PV and BESS requirements for additional building types, clarifying and simplifying lighting requirements, and increased efficiency for pool- and spa-heating equipment.

Solar PV and Battery Energy Storage Systems

- Adds building types in Tables 140.10-A and 140.10-B: events and exhibits, religious worship, sports and recreation, as defined under Section 100.1. Section 140.10(a-b)
- Updates photovoltaic (PV) sizing – multiply square footage of total solar access roof area (SARA) by 18 W/sqft for steep-sloped roofs, and 14 W/sqft for low-sloped roofs. Section 140.10(a)
- Increases PV capacity factors in Table 140.10-A, Section 140.10(a) for:
  - Libraries in Climate Zones 2–16
  - Hotel/motel, medical office building/clinics, restaurants, retail, grocery in all climate zones
- Updates Exception 5 for tenant spaces no more than 2,000 square feet with separate utility meter and HVAC system in multitenant buildings. These spaces are excluded from the PV calculation. Section 140.10(a)
- Updates Equations 140.10-B, -C, and -D for determining BESS minimum energy and power capacities. Section 140.10(b)
- Revises Table 140.10-B, Section 140.10(b):
  - BESS capacity factors revised for all building types

- Schools, offices, financial institutions, unleased tenant spaces, medical office buildings/clinics in Climate Zone 1 do not require BESS.

Heating, Ventilation and Air Conditioning (HVAC)

- Adds additional parameters for determining maximum achievable cycles of concentrations in mandatory cooling tower requirements. Section 110.2(e)
- Updates minimum ventilation rates, minimum exhaust rates, and classes of air streams or sources. Tables 120.1-A, -B and -C
- Adds mandatory limit for supply hot water temperature for space heating to no greater than 130°F. Section 120.2(l)
- Adds acceptance testing requirements. Section 120.5(a):
  - Dedicated outside air systems (DOAS), heat recovery ventilation (HRV), or energy recovery ventilation (ERV) systems, with exceptions
  - Conductivity controls and overflow alarms for open- and closed-circuit cooling towers
- Adds prescriptive requirements for multizone HVAC systems in offices and schools not greater than 150,000 square feet or five habitable stories, except for schools in Climate Zones 6 and 7. Section 140.4(a)3
- Adds the ASHRAE Handbook, Fundamentals Volume as an option for outdoor design conditions for systems serving non-healthcare facilities. Section 140.4(b)3A
- Adds prescriptive requirements per ASHRAE Guideline 36: for variable-air-volume (VAV) systems control sequence of operation for static pressure setpoint reset, space-conditioning zone controls with direct digital controls (DDC), air economizer with DDC system, and supply air temperature reset controls. Section 140.4(c-f, r)
- Revises prescriptive requirements for axial fan open-circuit cooling tower efficiency. Section 140.4(h)5
- Adds prescriptive requirements for mechanical heat recovery. Section 140.4(s)
- Adds requirements in Table 141.0-E-1 for new or replacement single zone packaged rooftop air conditioner or heat pump less than 65,000 Btu/hr. Section 141.0(b)2Cii

Lighting and Electrical

- Adds requirements for manual controls to be in same space as controlled lighting or located so that controlled lighting or status can be seen when operating controls. Section 130.1(a)2
- Multilevel controls must provide and enable continuous dimming from 100 to 10 percent or lower; exception for high-intensity discharge (HID) and induction light sources to have at least one control step between 30 and 70 percent of full power. Section 130.1(b)
- Removes Table 130.1-A. Section 130.1(b)
- Updates occupant sensing controls must have no more than 20-minute time delay. Section 130.1(c)1A
- Adds requirements for lighting in stairwells and common area corridors that provide access to guestrooms of hotel/motels shall be controlled by occupant sensing controls that separately reduce the lighting power in each space by at least 50 percent when the space is unoccupied instead of completely shutting off. Section 130.1(c)6C
- Clarifies occupant sensing controls requirements for warehouse areas, library stack aisles, corridors and stairwells, offices greater than 250 square feet, parking and loading/ unloading areas; all occupancy sensing control zones in offices greater than 250 square feet must be shown on plans. Section 130.1(c)6

- Updates daylight responsive controls requirements for sidelit and skylit daylit zones with 75 watts (W) or greater of general lighting in indoor spaces, 60 W or greater for garages. Secondary sidelit daylit zones with less than 85 W of general lighting exempt, if primary sidelit daylit zones do not require daylight responsive controls. Section 130.1(d)1
- Requires that luminaires longer than 8 feet must be controlled in segments up to 8 feet, unless they contain factory-assembled housing and light source as an integral unit in segments longer than 8 feet. These luminaires may be controlled according to the type of daylit zone in which the segment is primarily located. Section 130.1(d)2Biii
- Clarifies requirements for occupancy sensing controls for space-conditioning systems. Section 130.1(f)
- Updates motion sensing controls exception for building façade, ornamental hardscape, and outdoor dining areas. Section 130.2(c)3A
- Adds acceptance testing requirement for controlled environmental horticulture (CEH) lighting. Section 130.4(a)
- Removes Tailored Method of calculating lighting power allowances; moved some Tailored Method allowances as additional lighting power allowances to Area Category Method. Section 140.6
- Removes several automatically compliant sign light sources. Section 140.8(b)
- Requires that controlled receptacles in hotel/motel guestrooms must shut off within 20 minutes of vacancy. Section 130.5(d)4

Envelope

- Adds mandatory area-weighted U-factor 0.47 for exterior vertical fenestration assemblies. Exception for fenestration installed in Fire Hazard Severity Zones or Wildland-Urban Interface (WUI) Fire Areas. Section 120.7(d)
- Adds mandatory U-factor 0.58 for vertical fenestration replacements over 150 square feet and 0.47 for added vertical fenestration over 50 square feet. Section 141.0(b)1E
- Adds mandatory vestibule requirement at public entrances that open into spaces 3,000 square feet or more in newly constructed buildings of Occupancy Types A, B, E, I, and M. Multiple exceptions apply. Section 120.7(e)
- Reduces prescriptive maximum U-factors in Table 140.3-B for roofs and ceilings, and certain wall assembly types. Section 140.3(a)

Water Heating

- Adds backup heat required for heat pump water heater (HPWH) with unconditioned inlet air, unless compressor cutoff temperature below local Heating Winter Median of Extremes per Reference Joint Appendix JA2, Table 2-3. Section 110.3(c)7A
- Adds ventilation or minimum room volume requirements when installing consumer integrated HPWH. Section 110.3(c)7B
- Splits Table 120.3-A into Tables 120.3-A1 and -A2. Section 120.3

Pools and Spas

- Updates mandatory requirements for permanent, readable, and weatherproof label with energy efficiency rating and instructions for efficient pool and spa heater operation. Section 110.4(a)3
- Adds a requirement that pool and spa heaters must be tested to new standards, by fuel type. Section 110.4(b)
- Adds mandatory requirements for primary pool and spa heaters to be heat pump and/or solar, or use at least 60 percent renewable or recovered energy, sized appropriately. Several exceptions apply. Section 110.4(c)
- Updates controls for heat pump pool heaters must prevent supplementary heating when load can be met by heat pump alone. Section 110.4(d)

ENERGY CODE HOTLINE

Available to help with Energy Code (Title 24, Part 6) questions

SUBMISSION FORM

www.energy.ca.gov/energy-code-hotline-submission

SUPPORT CENTER FAQS

www.energy.ca.gov/energy-code-support-center

Covered Process

- Adds mandatory insulation requirements for pipes that carry heated or chilled fluids used in processes unrelated to space conditioning or water heating. Updates pipe insulation requirements in Tables 120.3-A1 and -A2. Section 120.3(a)
- Adds efficiency requirements for fan-powered evaporators using volatile refrigerants. Exception for evaporators for quick chilling/freezing. Updated efficiencies in Table 120.6-A-2. Section 120.6(a)3D
- Adds requirement for 0.5-inch applied static pressure drop maximum for evaporators. Section 120.6(a)3E
- Updates efficiency requirements for controlled environment horticulture (CEH) lighting systems to no less than 2.3 micromoles per joule. Section 120.6(h)
- Adds mandatory electric readiness requirements for newly constructed quick-service and institutional commercial kitchens. Exceptions are provided for healthcare facilities, all-electric commercial kitchens. Section 120.6(k)
- Updates requirements for laboratory and factory exhaust systems. Section 140.9(c)
- Adds alteration requirements for process piping. Section 141.1(d)

Performance Compliance

- The energy budget is now expressed in terms of Long-term System Cost (LSC) and Source Energy. LSC is categorized as Efficiency LSC and Total LSC with Efficiency LSC energy being the sum of the LSC energy for space-conditioning, water heating, mechanical ventilation, and lighting and Total LSC being the sum of Efficiency LSC and the LSC energy from the photovoltaic system, battery energy storage system, and demand flexibility. The Source Energy budget sums the same end uses as Total LSC but in Source Energy instead of LSC. Section 140.1(a)

First Hour Ratings for Storage Water Heaters

Reference Joint Appendix JA13.3.2 of the **2022** and **2025** Energy Codes requires heat pump water heaters (HPWHs) to meet a minimum first hour rating (FHR). Table 501.1(2) of the 2022 California Plumbing Code specifies the FHR requirement for storage water heaters based on the number of bedrooms and bathrooms in a dwelling unit. Table 501.1(2) includes a note that a water heater's FHR is found on the "Energy Guide" label. The Energy Guide label FHR does not address water heaters with integrated thermostatic mixing valves that can boost storage capacity and FHR by maintaining a storage tank temperature setpoint more than five degrees above the delivery temperature.

To address storage water heaters capable of achieving storage temperatures above 135°F, the U.S. Department of Energy has developed a new federal test procedure that goes into effect May 6, 2029, and includes new high-temperature testing requirements. Until May 6, 2029, such water heaters may voluntarily represent high-temperature performance based on the new test procedure.

Building officials may choose to accept these FHRs based on the high-temperature test procedure, which will be documented in manufacturers' literature. Doing so may allow installation of smaller- and/or lower-voltage heat pump water heaters in these jurisdictions. See **10 CFR Part 430, Subpart B, Appendix E** for more information.

ASHRAE Guidline 36 for the 2025 Energy Code

The 2025 Energy Code Section 140.4(r) prescriptively requires HVAC direct digital controller (DDC) logic to come from a programming library based on ASHRAE Guideline 36. Key considerations for complying with the new requirements are outlined in the Q&As below.

- What are the rules on updates for both ASHRAE Guideline 36 and the 2025 Energy Code?
  - The contractor's library will be certified once. If the CEC adopts a new version of Guideline 36 that affects Reference Joint Appendix JA18, then manufacturers may need to recertify. If the manufacturer updates the library and none of the changes apply to Reference Joint Appendix JA18, the original certification will stand.
- How will bug fixes in certified libraries be handled?
  - The CEC would review the portion of the logic being altered. If it's an unrelated bug fix and needs a new software version, a written statement describing the change along with a declaration for the new software version would be acceptable.
- How do the certification requirements in Section 140.4(r) relate to other references to Guideline 36 in Section 140.4?
  - If the programming library is certified per Section 140.4(r) and Reference Joint Appendix JA18, then it should meet all other requirements mentioning Guideline 36 (e.g., Sections **140.4(c]2**, **140.(d]2**). References before Section 140.4(r) are historical requirements for functionality, while the new requirements within Section 140.4(r) are specifically to certify the programming libraries that these functions originate from.
- Can a noncertified library still comply with the 2025 Energy Code?
  - Yes. Section 140.4(r) is a prescriptive requirement. Noncertified libraries can still bid on projects, but the project would need to comply with the 2025 Energy Code using the performance compliance approach.
- Can manufacturers submit for certification after the 2025 Energy Code goes into effect?
  - Yes, any manufacturer can submit at any time but will not be able to use programming libraries for compliance until the certification in accordance with Section 140.4(r) is complete.
- Is there a process to handle intellectual property and code developed by each manufacturer?
  - Yes. **Download the application for confidential designation** and file it with the CEC Docket Unit. This process can take up to 30 days. Manufacturers may also **contact the Docket Unit** with questions about the Confidentiality Designation.

AB130 Informational Bulletins

The California Building Standards Commission (CBSC) has released guidance on the enforcement of Assembly Bill 130. Visit the **CBSC Newsroom** for full details. Please note that the 2025 Energy Code has been adopted and will go into effect as scheduled January 1, 2026.

CBECC 2025 Software Update

Recently approved versions of the 2025 Energy Code compliance software are available:

- Single-family, nonresidential and multifamily buildings: CBECC 2025.2.0

Permit applications submitted on or after January 1, 2026, must use approved 2025 Energy Code compliance software and forms. Visit the 2025 Energy Code compliance software webpage for all of the approved software and the expiration dates.

CBECC 2025.2.0 will also feature a checkbox to allow designers of campus buildings under jurisdiction of the Division of the State Architect (DSA) or the California State University (CSU) to meet the solar PV requirements under the 2025 Energy Code by following relevant procedures from those agencies. When the checkbox is selected, the form will display a message that the project intends to follow DSA or CSU procedures for school campus PV systems to comply.

Local authorities having jurisdiction (AHJs) aside from DSA or the CSU are advised to disregard this message, if seen on their documentation.

EER/SEER Table Reference

Federal space-conditioning minimum efficiency requirements can be adopted between the triennial editions of the California Energy Code, which can cause confusion. Therefore, the 2025 Energy Code Section 110.2 does not list the federal minimum efficiency requirements for space-conditioning systems.

However, a reference resource has been compiled to help consolidate the latest values for builders. Please see the **2025 Space Conditioning Efficiency Tables** on the **2025 Energy Code webpage**.

Energy Code Support Center Updates

Please visit the Energy Code Support Center webpage for resources including fact sheets, FAQs, guides, presentations, training classes, videos, and links to additional resources. New resources include:

- **Electric Ready requirements web page**
- Online FAQs:
  - **2025 Single-Family Solar PV**
  - **2025 Single-Family Battery Energy Storage Systems (BESS) Ready**
  - **2025 Low-rise Multifamily Solar PV**
  - **2025 High-rise Multifamily Solar PV**
  - **2025 High-rise Multifamily Battery Energy Storage System (BESS)**
  - **2025 Nonresidential Solar PV**
  - **2025 Nonresidential Battery Energy Storage System (BESS)**

Q&A

Commercial Kitchens

Can a commercial kitchen with a 480V electrical service run lower amperage than specified under Section 120.6(k)1b of the 2025 Energy Code?

No. The requirement for a minimum capacity of 800A electrical service applies to the panel that serves the cookline appliances. This requirement is mandatory and can only be avoided by claiming an Exception to Section 120.6(k).

Lighting

Do the controlled environment horticulture (CEH) lighting requirements under Section 120.6(h)2 (2022) apply to spaces in nonresidential buildings with less than 40 kW of horticultural lighting?

No. Up to 40 kW of horticultural lighting specifically for plant growth are not subject to those requirements. However, general lighting in these spaces will still need to meet all applicable requirements.

Solar PV

Is solar PV required for churches under the 2022 Energy Code?

Possibly. **Section 140.10(a)** requires newly constructed nonresidential buildings to

install solar PV, if 80 percent of the total floor area is made up of space types listed under **Table 140.10-A**.

Churches are not specifically listed but can have enough floor area made up of listed space types (for example, office, school, auditorium). The local code enforcement agency can confirm the space types found within a building.

Are freestanding carports included in solar access roof area (SARA) calculations for nonresidential and multifamily buildings?

Yes. Sections **140.10(a)1**, **170.2(f)A**, and **170.2(g)1** of the 2025 Energy Code specify that SARA includes roof areas that can structurally support a PV system per the California Building Code, Part 2, Section 1511.10. SARA includes all roof space on covered parking areas, carports, and all other newly constructed structures onsite that can support a PV system.

If the project includes multiple buildings, the freestanding carport can be included on the compliance forms for any of the buildings on the same project.

Do the PV panels required by the Energy Code to meet the minimum PV system capacity for each building in a newly constructed multibuilding or nonresidential project have to be located on that building?

No. **Section 140.10(a)** sets the minimum kWdc of the solar PV system for each building but does not specify where it must be located, as long as the PV system is on the same project site. The PV system can be located on each building, all on one building, or even on the ground (see SARA requirements above). The enforcement agency will determine whether each building requires a permit application, and must approve the location and the allocation of the PV system generation to each building. Note that the load-serving entity may have interconnection requirements that need to be met.

FOR MORE INFORMATION

Energy Code Support Center: www.energy.ca.gov/energy-code-support-center

2025 Energy Code Webpage: www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2025-building-energy-efficiency

2025 Approved Compliance Software: www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2025-energy-code-compliance-software

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Blueprint newsletter serves as a resource to assist stakeholders in complying with the Energy Code. It does not provide legal advice. Please refer to California Code of Regulations, Title 24, Parts 1 and 6 for specific requirements.

CALIFORNIA ENERGY COMMISSION

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BLUEPRINT

CALIFORNIA ENERGY COMMISSION

EFFICIENCY DIVISION

In This Issue

2025 Energy Code: Multifamily Summary of Changes

The **2025 Energy Code** adds new heat pump water heater (HPWH) and HPWH-ready requirements for multifamily buildings, including ventilation, pipe insulation, and new system options for central water heating systems. Other multifamily updates include increasing envelope efficiency, introducing new requirements for energy recovery ventilation, refining solar photovoltaic (PV) and battery energy storage system (BESS) calculations, clarifying lighting requirements, and increasing the efficiency of pool- and spa- heating equipment.

Solar PV and Battery Energy Storage Systems

- Updates PV sizing when using total solar access roof area (SARA): SARA multiplied by 18 for steep-sloped roofs, and SARA multiplied by 14 for low-sloped roofs. Section 170.2(f)-(g)
- Increases minimum PV system size to 4 kWdc for low-rise multifamily for Exception 2 to Section 170.2(f)
- Updates Exception 5 to apply to high-rise multifamily buildings in areas with no PV compensation through virtual energy bill credits. Section 170.2(g)
- Updates Table 170.2-U and Table 170.2-V. Sections 170.2(g)-(h):
  - Increases PV capacity factors for some buildings/climate zones. Section 170.2(g)
  - Adds building types in Table 170.2-U and Table 170.2-V: events and exhibits, religious worship, and sports and recreation. Section 170.2(g)-(h)
  - Updates Table 170.2-V BESS capacity factors for all building types and climate zones. Section 170.2(h)
- Updates Equations 170.2-E, F, and G. Section 170.2(h)

Envelope

- Updates mandatory wall insulation maximum U-factors. Section 160.1(b):
  - Metal framed and others: U-0.151
  - 2x4" Wood framed and others: U-0.095
  - 2x6" Wood framed and others: U-0.069

- Adds new mandatory requirements for slab edge insulation. Section 160.1(b):
  - Maximum aged solar reflectance (SR) for Option B steep-sloped roofs: aged SR 0.25 in climate zones 10, 11, 13, 15; aged SR 0.20 in climate zones 12 and 14
  - Option D low-sloped roofs aged SR 0.63 and thermal emittance 0.75, or SRI 75 in climate zones 2, 4, 6-15
- Updates prescriptive fenestration maximum U-factors in Table 170.2-A for all other fenestration. Section 170.2(a)3:
  - U-0.28 in Climate Zones 1,3-5, 11, 13-16
  - U-0.30 in Climate Zones 2, 8-10, 12
  - U-0.24 in Climate Zones 6 and 7

HVAC

- Updates requirements that multifamily dwelling units must have balanced or supply ventilation system, with compartmentalization verified by Energy Code Compliance (ECC)-Rater. Section 160.2(b)2Aivb
- Adds mandatory requirements for balanced and supply-only ventilation to have accessible air filters, including heat/energy recovery ventilators (HRV/ERVs) for attached dwelling units. Section 160.2(b)2Axi
- Adds exception for central ventilation system duct sealing requirements for attached dwelling units in low-rise multifamily buildings in Climate Zone 6. Section 160.2(b)2C
- Updates mandatory. Section 160.3(b):
  - Exception for block loads in determining system size for additions
  - Outdoor design conditions may be selected using Reference Joint Appendix JA2, ASHRAE Handbook Fundamental Volume, or ACCA Manual J
  - Capacity variation requirements for variable or multi-speed system with third party thermostats
- Adds mandatory acceptance testing requirements for dedicated outdoor air systems (DOAS) and HRV/ERV systems, with some exceptions. Section 160.2(d)1D
- Updates prescriptive requirements: balance systems with HRV/ERV for dwelling units in Climate Zones 1, 2, 4, 11-14, 16; all HRVs and ERVs to have fault indicator display (FID) with ECC-rater verification. Section 170.2(c)3Biv
- Updates prescriptive requirements for cooling tower to have minimum rated efficiency per Table 170.2-I. Section 170.2(c)4Fv
- Revises prescriptive requirements for DOAS. Section 170.2(c)4N
- Adds exception for dwelling unit air leakage test for additions. Section 180.1(a)2
- Adds exception for dwelling unit air leakage test for alteration. Section 180.2(b)5

Lighting

- Updates mandatory requirements for dwelling units: all installed luminaires and light sources to meet JA8 criteria; removes Table 160.5-A and references. Section 160.5(a)1A
- Clarifies lighting integral to kitchen range hoods and bathroom exhaust fans do not require dimming controls. Section 160.5(a)2F
- Updates and clarifies mandatory common area lighting requirements:
  - Exception for block loads in determining system size for additions
  - Multilevel controls must provide and enable continuous dimming from 100 to 10 percent or lower; removes Table 160.5-B; Exception 3 allows HID and induction luminaires to have one control step between 30 and 70 percent. Section 160.5(b)4B
  - Occupant-sensing controls must have no more than 20-minutes time delay; Exception 4 applies only to emergency lighting intended to function only when normal power is absent. Section 160.5(b)4Ci

- Lighting in restaurants does not require automatic holiday shut-off feature with automatic time-switch controls. Section 160.5(b)4Cvi
- Occupancy sensing controls for offices greater than 250 square feet must be shown on plans. Section 160.5(b)4Cvi
- Daylight responsive controls are now required in daylit zones with 75 watts or more of general lighting; luminaires longer than 8 feet must be controlled in segments up to 8 feet; Exception 3 applies to secondary sidelit daylit zones with less than 85W of general lighting from daylight response controls, when primary sidelit daylit zones do not require daylight responsive controls. Section 160.5.(b)4D
- Control interactions for occupied-standby space conditioning zones. Section 160.5(b)4F

- Clarifies which outdoor luminaires require motion sensors. Section 160.5(c)2Ci
- Removes prescriptive Tailored Method of calculating lighting power allowances in common use areas; some allowances moved to Area Category Method. Section 170.2(e)3D and 4B
- Removes most automatically compliant, sign light sources. Section 170.2(e)7B

Water Heating

- Updates requirements for heat pump water heaters (HPWHs):
  - HPWHS with unconditioned inlet air must have backup heat, unless compressor cutoff temperature below local Heating Winter Median of Extremes. Section 110.3(c)7A
  - Adds ventilation or minimum space volume requirements when installing consumer integrated HPWH. Section 110.3(c)7B
- Adds piping insulation requirements, insulation on first 8 feet of cold water piping, insulation continuity, pipe supports must be on outside of insulation, isolation valves must be extended-stem, and insulation for hot water plumbing appurtenances. Section 160.4(e)
- Updates prescriptive water heater options for multifamily dwellings with individual water heaters; removes tankless gas water heaters (low-rise multifamily buildings only), adds 120V HPWH. Section 170.2(d)1
- Updates prescriptive requirements for central systems. Section 170.2(d)2:
  - HPWH can meet NEEA Advanced Water Heater Specification for Commercial HPWH Tier 2 or above
  - Primary HPWH must be single-pass
  - All hot water pipes must meet California Plumbing Code Appendix M
  - Systems serving buildings with more than eight dwelling units must have recirculation systems with thermostatic mixing valve on each supply and return loop, meet RA4.4.19
  - Pipe insulation requires ECC-rater verification per RA3.6.3

ENERGY CODE HOTLINE

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SUPPORT CENTER FAQS

www.energy.ca.gov/energy-code-support-center

Pools and Spas

- Adds pool and spa heaters must be tested. Section 110.4(c)
- The new requirement for primary pool and spa heaters to be heat pump, solar, or use at least 60 percent renewable/recovered energy, sized appropriately. Section 110.4(c)
- Clarifies public pools and spas must meet requirements under Section 150.0(p)2-4. Section 160.7(b)

Electric Ready

- Adds mandatory HPWH-ready requirements for individual dwellings and central systems, including dedicated receptacle, condensate drain, designated space, and ventilation. Section 160.9(e-f)

Performance Approach

- Updates the energy budget to be expressed in terms of long-term system cost (LSC) and source energy. For multifamily, the source energy budget applies the mandatory and prescriptive requirements of the standard design, except with a consumer gas or propane water heater, to the proposed design. Section 170.1(a):
  - Total LSC is the sum of Efficiency LSC and LSC energy for solar PV, BESS, and demand flexibility
  - Efficiency LSC is the sum of the LSC energy for space-conditioning, water heating, mechanical ventilation, lighting, and self-utilization credit
  - Source energy budget sums the same end uses as Total LSC but in source energy
- Adds verification requirements for thermal balancing valves with variable-speed circulation pump(s). Section 170.1(b)2D requirements upon request.

Download the **2025 Energy Code** and the **2025 Reference Appendices** on the **2025 Energy Code webpage** for more information.

Energy Code Compliance Study

The California Energy Commission (CEC) is conducting a study to seek ways to improve implementation of the Energy Code across all communities. Effectively implementing the Energy Code is essential to ensuring real-world results from energy policies. The study will:

- Allow local authorities having jurisdiction (AHJs) to evaluate how well the Energy Code works.
- Help identify practical improvements.
- Inform future policy decisions based on what actually happens in-field.
- Provide tools and resources to support inspections and enforcement.
- Provide understanding of the code compliance through data analysis.

In addition, AHJs may qualify for federal funding to enhance Energy Code compliance, while working with CEC experts.

There are several ways to get involved:

- Schedule consultations with CEC staff
- Join a quarterly advisory group
- **Sign up** for more information

2025 Energy Code Energy Conservation Manual Certified

The CEC has certified the 2025 Energy Conservation Manual, which include the following support items for nonresidential, multifamily, and single-family buildings:

- Alternative Calculation Method (ACM) Reference Manuals
- Compliance Manuals
- Data registry Requirements Manual
- Compliance documents

Please visit the **2025 Energy Code webpage** to view these items, and for more information.

The CEC welcomes feedback on Blueprint.
Please contact the editor at **Title24@energy.ca.gov**

Energy Code Support Center Updates

New **2025 Energy Code Significant Changes Overview presentation**.

Please visit the **Energy Code Support Center webpage** for resources including fact sheets, FAQs, guides, training courses, videos, and more resources.

2025 Battery Energy Storage System Capacities Corrections

2025 Energy Code Table 140.10-B and Table 170.2-V contain battery energy storage system (BESS) capacity factors that do not align with technical recommendations. Corrections will be published as an errata to the 2025 California Building Standards Code and will take effect on January 1, 2026.

These updates are summarized in Table 1. Please visit **Docket #24-BSTD-01** for more information.

Tables(s)	Building Type	Climate Zone	BESS Capacity Factor (Wh/ft² of Conditioned Floor Area), Errata
140.10-B	Retail, Grocery	3	1.71
140.10-B, 170.2-V	Warehouse	1	Not Required

Table 1: Corrections to 2025 Energy Code BESS Capacity Requirements

2025 Energy Code Compliance Software Approved

Recently approved versions of the 2025 Energy Code compliance software available:

- Single-family buildings
  - CBECC-Res 2025.1.0
- Nonresidential and multifamily buildings
  - CBECC 2025.1.0

Permit applications submitted on or after January 1, 2026, must use approved 2025 Energy Code compliance software and forms. Visit the **2025 Energy Code compliance software webpage** for all of the approved software and the expiration dates.

Golden State Registry Approved

The CEC approved Golden State Registry (GSR) as a home energy rating system (HERS) Provider and data registry for prescriptive single-family HVAC alterations under the 2022 Energy Code.

Single-family projects requiring field verification and diagnostic testing by a HERS rater must register all associated compliance forms with an approved data registry per 2022 Energy Code **Section 10-103(a)**. Projects that do not require HERS rating do not need to register their compliance forms.

For more information, please visit the **Home Energy Rating System Provider webpage** and the **Energy Code Support Center HERS webpage**.

Assembly Bill 130

Governor Gavin Newsom signed **Assembly 130**, which pauses new updates to the California Building Standards Code, including the Energy Code, that affects residential units until January 1, 2032. The law also limits cities and counties in adopting stricter local building codes on or after October 1, 2025, unless specific conditions are met.

Q&A

Los Angeles Area Wildfire Rebuilds

Are solar PV and battery energy storage systems required for the Los Angeles County and Ventura County wildfire residential builds?

No. **Executive Order N-29-25** suspends the solar PV and battery energy storage requirements of the California Energy Code, as they apply to newly constructed residential dwellings. Projects to repair, restore, demolish, or replace residential structures or facilities substantially damaged or destroyed in wildfire emergency (including the Palisades, Eaton, Hurst, Lidia, Sunset Woodley, and Hughes fires), do not need to meet the solar PV and battery energy storage requirements of the 2022 Energy Code. Note: Solar-ready requirements are still required as applicable. The CBECC-Res and CBECC software have been updated with the new suspensions. Please visit the **2022 Energy Code Compliance software** webpage.

Does the solar PV suspension apply to new accessory dwelling units (ADUs) if they are planned concurrently with the rebuild?

Yes, the solar PV suspension applies to new ADUs that are part of a project to rebuild the primary residences that was damaged.

Do Los Angeles County and Ventura County wildfire residential rebuilds need to comply with the 2025 Energy Code?

No. **Executive Order N-29-25** allows wildfire rebuild projects in the specified jurisdictions above to continue meet the 2022 Energy Code beyond the January 1, 2026, effective date of the 2025 Energy Code.

Executive Order N-20-25 allows residential dwellings designed and built to the 2019 California Building Standards Code that were destroyed in this emergency to be permitted for reconstruction using the original dwelling design that met the 2019 Codes without additional plan review, at the discretion of the local enforcement agency.

Do the solar-ready requirements in Section 110.10 apply to an individual wildfire rebuild?

Yes. If the subdivision map 10 or more single-family homes was deemed complete on or after July 1, 2014, then the solar-ready requirements will apply to individual home being rebuilt within that subdivsion.

Solar PV

Does a solar PV system need to only serve the pool or spa system to use electric resistance heating per Exception 2 to Section 110.4(a)4 of the 2022 Energy Code?

No. The solar PV does not need to serve only the pool or spa, but the solar PV must be connected to the same meter as the pool or spa system.

Can solar PV systems for multifamily mixed-use occupancy buildings serve the common areas and not the individual dwelling units?

Yes. The Energy Code does not specify whether the solar PV system must serve the dwelling unit meters, mixed-use meters, or common area meters.

Room Air Conditioners and Heat Pumps

Does the Energy Code have efficiency requirements for room air conditioners and heat pumps?

No. But per Energy Code **Sections 110.0 and 110.1**, they must meet all applicable state and federal appliance efficiency requirements.

Can room air conditioners and heat pumps be prescriptively installed to replace existing space conditioning systems in existing residential buildings?

Yes. Energy Code **Sections 110.0 and 110.1** require these systems to meet any applicable state and federal efficiency requirements. Also, if this the main heating source for the dwelling, it must meet the minimum sizing requirements of the California Building Code.

For additional help with the Energy Code, see Energy Code Ace's **online offerings** of trainings, tools, and resources.

FOR MORE INFORMATION

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Home Energy Rating System (HERS): www.energy.ca.gov/HERS

2025 Energy Code Webpage: www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2025-building-energy-efficiency

2025 Approved Compliance Software: www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2025-energy-code-compliance-software

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BLUEPRINT

CALIFORNIA ENERGY COMMISSION
EFFICIENCY DIVISION

In This Edition

2025 Energy Code: Single-Family Summary of Changes

One of the significant changes in the 2025 Energy Code for single-family buildings is the prescriptive requirement for both water heating and space heating to be heat pumps. The 2025 Energy Code updates increase the building envelope efficiency, refine solar photovoltaic calculations, clarify the requirements for lighting, and increase the efficiency of pool and spa heating equipment.

Solar PV and Battery Energy Storage System Ready

- Updates mandatory battery energy storage system (BESS) readiness for newly constructed, single-family, one or two dwelling units with electrical service over 125A. BESS-ready is not required if BESS is installed. Section 150.0(s)
- Updates PV sizing when using total solar access roof area (SARA): SARA multiplied by 18 for steep-sloped roofs and SARA multiplied by 14 for low-sloped roofs. Section 150.1(c)14

Envelope

- Updates mandatory wall insulation maximum U-factor of 0.095 for 2x4 wood framed (minimum R-15) and maximum U-factor of 0.069 for 2x6 or greater wood-framed (minimum R-21). Section 150.0(c)
- Updates prescriptive Table 150.1-A Option C for ventilated attic minimum R-38 in climate zones 1, 8-16, minimum R-30 climates zones 2-7; adds cathedral ceilings minimum R-38 in all climate zones. Section 150.1(c)1Aiii
- Updates mandatory weighted average maximum U-factor of 0.40 for all fenestration, including skylights. Section 150.0(q)
- Updates prescriptive maximum U-factor of 0.27 for fenestration in Climate Zones 1-5, 11-14, 16, and maximum U-factor of 0.30 in Climate Zones 6-10, 15; some exceptions may apply. Section 150.1(c)3A

HVAC

- Clarifies that block loads (total load for all rooms served by central equipment) may be used to size the system for additions. Section 150.0(h)1
- Updates mandatory heat pump minimum heating capacity to meet the California Building Code (CBC) minimum requirements, without accounting for supplementary heating; no maximum heating capacity limit; furnace heating capacity based on ACCA Manual S-2023, Table N2.5. Section 150.0(h)5
- Updates mandatory installer-adjustable defrost delay timers on heat pumps to be set to 90+ minutes; the installer tests and certifies on CF2R; some exceptions may apply. Section 150.0(h)6
- Updates mandatory heat pump supplementary heating to only operate at outdoor temperatures below 35°F, except during defrost or emergency operation; the installer tests and certifies on CF2R; some exceptions may apply. Section 150.0(h)7
- Updates mandatory electric resistance supplementary heat capacity not to exceed heat pump nominal cooling capacity; (95°F ambient conditions) times 2.7 kW per ton, rounded up to the closest kW. Section 150.0(h)8
- Adds mandatory variable or multi-speed systems controlled by third-party thermostats to be able to respond to loads by modulating compressor speed and meet Section 150.0(i)2. Section 150.0(h)9
- Updates mandatory thermostats controlling heat pumps with supplementary heat to require display of outdoor temperature from a sensor or internet weather service; also must indicate when supplementary or emergency heat is in use; and lock out supplementary heat when the outdoor temperature is above 35°F; the installer tests and certifies on CF2R; some exceptions may apply. Section 150.0(i)2
- Revises mandatory duct insulation in unvented attics; exception allows R-4.2 when other requirements are met. Section 150.0(m)1Bi
- Updates exception to mandatory requirements for multispeed or variable speed compressor systems with controls that vary fan speed per number of zones as certified by the installer may meet airflow and fan efficacy requirements by operating at maximum compressor capacity and fan speed, with all zones calling. Section 150.0(m)13C
- Updates mandatory whole dwelling unit mechanical ventilation requirements: balanced and supply-only systems accessibility of IAQ filters; HRV/ERV and IAQ system components; and outdoor air intake design, location, and accessibility. Section 150.0(o)1C

ENERGY CODE HOTLINE

Available to help with Energy Code (Title 24, Part 6) questions

SUBMISSION FORM
www.energy.ca.gov/energy-code-hotline-submission

SUPPORT CENTER FAQS
www.energy.ca.gov/energy-code-support-center

- Updates prescriptive requirements: heating equipment to be heat pump in all Climate Zones or meet performance requirements in Section 150.1(b)1; refrigerant charge verification for heat pumps in all Climate Zones, and air conditioners in Climate Zones 2, 8-15; HRV/ERV systems require fault indicator display with ECC-rater field verification. Section 150.1(c)6-7,15
- Updates additions maximum heating and cooling capacity limits in Tables 150.2-A and -B that depend on relative sizes of calculated heating design load and cooling design

load, type of space conditioning system, and duct sizing; envelope leakage specified in load calculation must not exceed values from Table 150.2-C; when ECC-rater field verified, tested envelope leakage value may be used. Section 150.2(a)1E

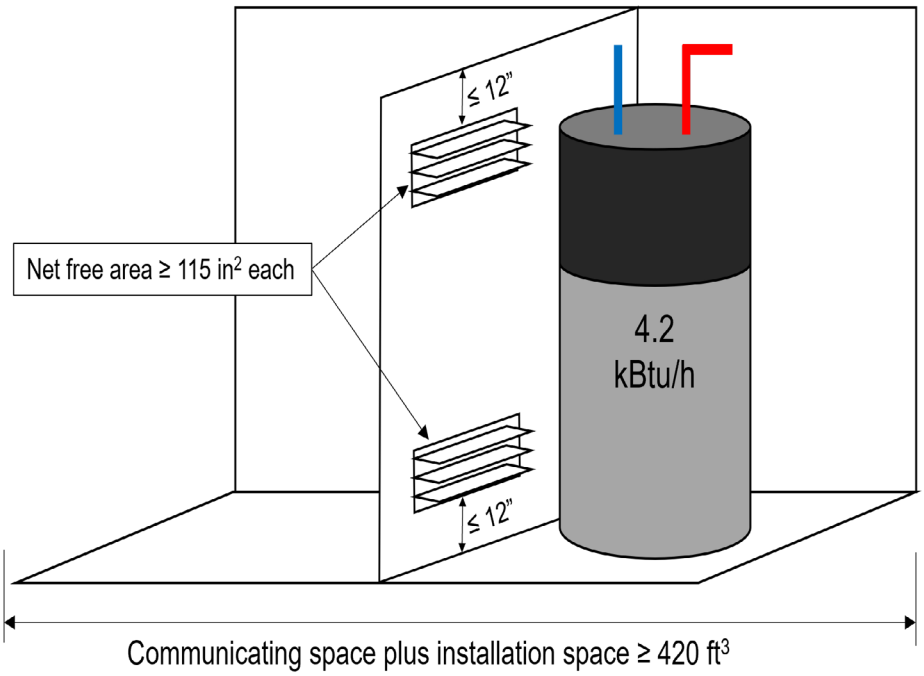
Lighting

- Updates all luminaires and light sources to meet Reference Joint Appendix JA8; some exceptions may apply; removes Table 150.0-A. Section 150.0(k)1A
- Updates lighting integral to kitchen range hoods and bathroom exhaust fans not to require dimming controls. Section 150.0(k)2F

Water Heating

- Updates requirements for backup heat in heat pump water heaters (HPWH) with unconditioned inlet air, unless compressor cutoff temperature below local Heating Winter Median of Extremes. Section 110.3(c)7A
- Adds ventilation or minimum room volume required when installing HPWH (Figure 1). Section 110.3(c)7B
- Updates mandatory requirement for a future HPWH conductor to be a minimum 30A branch circuit. Section 150.0(n)1Ai
- Removes exception for gas tankless water heaters in Climate Zones 3, 4, 13, and 14 in building with heat pump space conditioning. Section 150.1(c)8
- Removes gas tankless water heaters from prescriptive options for single-family additions. Section 150.2(a)1D

Figure 1: Example of HPWH ventilation per Section 110.3(c)7B3



Pools and Spas

- Adds pool and spa heaters must be tested to new standards, by fuel type. Section 110.4(b)
- Adds primary pool and spa heaters must be heat pump, solar, or use at least 60% renewable or recovered energy, and sized appropriately. Some exceptions may apply. Section 110.4(c)
- Updates controls for heat pump pool heaters to prevent supplementary heating when the load can be met by the heat pump alone. Section 110.4(d)
- Clarifies when dedicated-purpose pool pumps must meet Title 20, Section 1605.1(g) (7); replacement dedicated-purpose pool pump motors must meet Title 20, Section 1605.3. Section 150.0(p)1A
- Updates dedicated-purpose pool pumps with more than one speed to have controls that default to the filtration flow rate when auxiliary pool loads are not operating. Section 150.0(p)1D
- Updates dedicated-purpose pool pumps with more than one speed to have controls that default to filtration flow rate setting within 24 hours and have override capability for servicing. Section 150.0(p)1E

Outreach 2024 Year in Review

Performance Compliance

- Updates the energy budget is expressed in terms of long-term system cost (LSC) and source energy; LSC is categorized as Total LSC and Efficiency LSC; Total LSC is the sum of Efficiency LSC, the LSC for photovoltaic system, battery energy storage system, lighting, demand flexibility, and other plug loads; the Efficiency LSC energy is the sum of the LSC energy for space-conditioning, water heating, mechanical ventilation, and self-utilization credit. Section 150.1(a)

Download the final express terms for the 2025 Energy Code and the 2025 Reference Appendices on the **docket 24-BTSD-01**. Please visit the **2025 Energy Code webpage** for more information.

Compliance Software Updates

Recently approved versions of the 2022 Energy Code compliance software are available on the **2022 Energy Code compliance software webpage**.

Single-family buildings

- CBECC-Res 2022.3.2
- EnergyPro 9.4

Nonresidential and multifamily buildings

- CBECC 2022.3.2
- EnergyPro 9.4

All permit applications submitted on or after January 1, 2023, must comply using software and compliance forms approved for the 2022 Energy Code. Visit the **2022 Energy Code compliance software webpage** for all of the approved software and the expiration dates.

Energy Code Support Center Updates

Please visit the **Energy Code Support Center webpage** for resources including fact sheets, frequently asked questions, guides, presentations, training classes, videos, and links to additional resources. New resources on the **2025 Energy Code Overview webpage** include:

- Single-Family Summary of Changes
- Single-Family Mandatory Requirements
- Nonresidential Summary of Changes
- Multifamily Summary of Changes

Q&A

Single-Family Outdoor Lighting

Do outdoor lighting with LED light sources in enclosed or recessed luminaires need to meet the requirements of JA8 for the 2025 Energy Code?

No. Outdoor lighting with an LED light source installed in an enclosed or recessed luminaire does not need to meet the JA8 requirements per exception 4 to Section 150.0(k)1A. However, all non-LED light sources in enclosed or recessed luminaires must comply with the JA8 elevated temperature requirements per Section 150.0(k)1D.

For additional help with the Energy Code, see Energy Code Ace's **online offerings** of trainings, tools, and resources.

FOR MORE INFORMATION

Energy Code Support Center: www.energy.ca.gov/energy-code-support-center

Energy Code Compliance Program: www.energy.ca.gov/programs-and-topics/programs/energy-code-compliance-program

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2022 Approved Compliance Software: www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2022-building-energy-efficiency-1

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CALIFORNIA ENERGY COMMISSION

EFFICIENCY DIVISION

In This Issue

The CEC welcomes feedback on Blueprint. Please contact the editor at **Title24@energy.ca.gov**

2022 Energy Code: HVAC Efficiencies

The **2022 Energy Code Section 110.2** includes minimum efficiency requirements for variable refrigerant flow (VRF) air conditioners and heat pumps. The efficiency metrics were based on an AHRI test procedure that was updated. Effective January 1, 2024, the US Department of Energy (DOE) adopted new minimum integrated energy efficiency ratio (IEER) efficiencies for VRF equipment with cooling capacity of 65,000 Btu/h or greater based on the updated testing procedures.

The California Energy Commission (CEC) has published an advisory on the **VRF minimum efficiency requirements** to assist the authorities having jurisdiction (AHJ) in confirming that the proposed equipment on the certificate of compliance forms and the installed equipment on the certificate of installation forms meet the updated efficiencies. Please see the advisory on the **Regulatory Advisories webpage** for additional guidance.

HERS Program Updates

The CEC adopted the **2025 Energy Code** which includes updates to HERS field verification and diagnostic testing (FV&DT) requirements to support compliance. The FV&DT program regulations were migrated from Title 20 to Title 24 under the **2025 Energy Code**.

The FV&DT compliance program will become the Energy Code Compliance (ECC) Program. A new **ECC Program webpage** has been launched to provide guidance on the upcoming ECC program, including frequently asked questions. For more information about the new ECC program please visit the **Energy Code Compliance program webpage**.

The current HERS FV&DT program will remain in place until the **2025 Energy Code** is effective January 1, 2026. For more information about the existing HERS program please visit the **HERS program webpage**.

JA8 Lighting Test Updates

The **2022 Reference Joint Appendix JA8** requirements specify EnergyStar testing methods that lighting products must undergo to meet the JA8-2022 and JA8-2022-E certification standards. The EnergyStar program for lamps and luminaires will be discontinued on December 31, 2024. The 2025 Energy Code includes updated testing procedures. To certify JA8-compliant lamps and luminaires before the effective date of the 2025 Energy Code, the CEC can provide the test procedures details upon request.

The **2025 Energy Code** replaces the EnergyStar tests with updated testing procedures in the new Sections JA8.7 and JA8.8. Per the revisions to Section JA8.5 products with the marking JA8-2025-E for elevated temperature must meet new federal test procedures. The CEC can provide details of the federal test procedures related to the JA8-2025-E requirements upon request.

Lighting products certified as meeting JA8 for the 2016 Energy Code, 2019 Energy Code, and 2022 Energy Code will be accepted for compliance with JA8 for the 2025 Energy Code. For more information, please visit the **2025 Energy Code webpage**.

Energy Code Support Center

Please visit the **Energy Code Support Center webpage** for resources including fact sheets, frequently asked questions, guides, presentations, training classes, videos, and links to additional resources. New resources for the 2022 Energy Code include:

- An instructional guide to outdoor lighting zones on the **Lighting webpage**
- The **Accessory Dwelling Units FAQs** on the **Accessory Dwelling Units webpage**

Q&A

Single-Family Ductless Mini-Splits

Does the Exception to Section 150.0(a)1 of the 2022 Energy Code apply to a newly constructed single-family dwelling with a ventilated attic when a ductless mini-split is being used to serve the entire dwelling?

Yes. The **Exception to Section 150.0(a)1** to the mandatory roof deck insulation applies when there are no ducts in the attic and the air handler is located in conditioned space below the ceiling separating the occupiable space from the attic.

The **Exception to Section 150.0(a)1** also applies if a space-conditioning system air handler with up to 12 linear feet of supply ducts is located in unconditioned space, when all other portions of the supply ducts are located in conditioned space below the ceiling separating the occupiable space from the attic.

Single-Family Solar Photovoltaic (PV) Exceptions

Can more than one exception be claimed under the solar PV requirements of Section 150.1(c)14 of the 2022 Energy Code for newly constructed single-family buildings?

No. For example, **Exception 2 to Section 150.1(c)14** applies when either **Equation 150.1-C** outputs less than 1.8 kWdc or the solar access roof area (SARA) does not allow a 1.8 kWdc system to fit on the roof. **Exception 5 to Section 150.1(c)14** applies to reduce the required PV size by 25 percent when installing a

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battery storage system. Exception 2 cannot be combined with the application of Exception 5. When Exception 5 applies then the project requires both PV and battery storage to be installed.

Nonresidential Solar PV and Battery Storage Systems

Does a newly constructed unconditioned warehouse, with conditioned support areas and offices, need to comply with the PV requirements in Section 140.10 of the 2022 Energy Code?

Yes. Buildings with any conditioned floor area (CFA) of the space types listed in **Table 140.10-A**, such as warehouse or office, including the conditioned spaces supporting these areas (e.g., restrooms, closets, corridors), shall have a solar PV system installed. The PV system size is determined by **Equation 140.10-A**, or the total of all available solar access roof areas (SARA) multiplied by 14 watts per square foot, whichever is smaller. **Exceptions to Section 140.10** may apply.

Does Exception 3 to Section 140.10(b) for battery storage systems apply to a newly constructed multi-tenant building, where each tenant space is less than 5,000 square feet of CFA, but the total building CFA equals more than 5,000 square feet?

Yes. **Exception 3 to Section 140.10(b)** of the 2022 Energy Code applies to mixed-use buildings with separate tenant spaces of 5,000 square feet or less of CFA. For example, a mixed-use building with 7,000 square feet of CFA that consists of two tenant spaces of 4,000 square feet and 3,000 square feet could claim **Exception 3 to Section 140.10(b)** since each tenant space is less than 5,000 square feet of CFA.

For additional help with the Energy Code, see Energy Code Ace's **online offerings** of trainings, tools, and resources.

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CALIFORNIA ENERGY COMMISSION

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BLUEPRINT

CALIFORNIA ENERGY COMMISSION

EFFICIENCY DIVISION

In This Issue

2025 Energy Code Adopted

The California Energy Commission (CEC) adopted the 2025 Energy Code. The **2025 Energy Code** will go into effect on January 1, 2026, following approval by the California Building Standards Commission. The 2025 Energy Code updates focus on these areas:

- Building envelope efficiency
- Heat pumps for space conditioning and water heating in single-family and select nonresidential buildings
- Multifamily water heating, electric-readiness, and ventilation
- Pool and spa water heating systems
- Solar photovoltaic (PV) and battery energy storage systems for select buildings
- Electric-readiness for commercial kitchens
- Covered processes pipe insulation, laboratory and factory exhaust systems

The 2025 Energy Code includes changes to improve clarity and consistency, correct errors, streamline requirements, and align with national standards and other parts of the California Building Standards Code.

For more information, please see the **2025 Energy Code Fact Sheet** and visit the **2025 Energy Code webpage**.

Energy Code Support Center

The Online Resource Center is now the **Energy Code Support Center**. The support center provides educational assistance to the building industry and enforcement communities related to the Energy Code. In partnership with California utility companies, the CEC develops resources including fact sheets, frequently asked questions, guides, presentations, training classes, videos, and provides links to additional resources.

Recently launched with a new name and look, the support center has been reformatted to improve user experience. It now includes frequently asked questions and reduces scrolling while browsing Energy Code topics. Some highlights of the recent changes are:

Hotline Submission Form

The **Energy Code Hotline Submission Form** is a simple online form designed to collect the necessary information about Energy Code questions, allowing the Hotline to respond to questions without first needing to reach out for more information.

Training Resources

A new 2022 Accessory Dwelling Units training presentation for the 2022 Energy Code is available on the Energy Code Support Center **Overview webpage**.

For more information, please visit the **Energy Code Support Center webpage**.

Acceptance Testing

The Energy Code requires acceptance testing for lighting controls, mechanical systems, fenestration, and covered processes in nonresidential and multifamily buildings. Acceptance testing consists of visual and functional performance testing of installed equipment. Acceptance testing helps ensure that the installed equipment operates as designed and complies with the Energy Code.

Only certified acceptance test technicians (ATTs) may perform required tests for lighting controls and mechanical systems in nonresidential and multifamily buildings. The CEC approves Acceptance Test Technician Certification Providers (ATTCPs) to train, certify, and oversee the technicians and their employers. The tests and ATTs are subject to quality assurance inspections by the ATTCP. For more information on the ATTCP program, please see the **ATTCP Frequently Asked Questions (FAQs) webpage**.

A current review of ATT field test data has revealed that compliance with the acceptance testing requirements is low. Specifically, applicable acceptance tests and forms are not being specified on the respective nonresidential certificate of compliance (NRCC), and subsequently the applicable acceptance tests and nonresidential certificate of acceptance (NRCA) are not being completed after installation.

The authorities having jurisdiction (AHJs) are responsible for enforcement of the acceptance testing requirements in nonresidential and multifamily buildings. Relying on the ATTCP program to ensure the Energy Code requirements are met helps reduce the time and effort required of AHJs at plan review and site inspection. At plan review, AHJs should review the NRCCs which identify the mechanical and lighting control systems acceptance tests that must be performed by a certified ATT. At inspection, the completed NRCAs must be made available to the AHJ before issuance of the certificate of occupancy per **Section 10-103(a)4C**. The AHJ should verify the ATT's certification status on the ATTCP's website and that the NRCAs are watermarked with the ATTCP logos.

CEC staff is available upon request to provide training to AHJs on the ATTCP program for lighting controls and mechanical systems. AHJ staff are encouraged to complete a free Inspector and Design Professional Training provided by the **National Energy Management Institute (NEMI)**. The NEMI course outlines the requirements for physical testing and verification of the mechanical NRCA forms. It helps AHJs understand how the design objective is met and complies with the 2022 Energy Code. It is accredited by the International Code Council (ICC) for continuing education units.

For questions on the ATTCP program or to request free ATTCP training, please contact the Standards Compliance Branch at **SCO@energy.ca.gov**. For more information, please visit the **ATTCP webpage**.

Acceptance Testing Resources

Acceptance testing resources are available on the **ATTCP webpage** under educational resources.

- Inspector Field Sheet
- CBECC 3.1 updates to trigger acceptance tests on the NRCCs

Updated 2022 Energy Code acceptance testing resources

The CEC welcomes feedback on Blueprint. Please contact the editor at **Title24@energy.ca.gov**

are available on the **Energy Code Support Center webpage** under acceptance test technicians.

- 2022 ATTCP counter card
- 2022 ATTCP presentation

HERS Program Updates

The CEC has approved CHEERS as a provider of a low-rise multifamily data registry under the 2022 Energy Code.

CalCERTS has ceased operations as a HERS provider. Please visit the updated **Home Energy Rating System providers** webpage and see the Advisement - CalCERTS Closure on the **Regulatory Advisories webpage** for additional guidance.

For more information about the HERS program please visit the **HERS program webpage**.

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Q&A

Nonresidential Economizers

Does adding an economizer to an existing chilled water cooling system trigger the 2022 Energy Code requirements?

Yes. A newly installed economizer added to an existing chilled water cooling system would need to meet **Section 140.4(e)**. Per **Exception 4 to Section 141.0(b)2C** the economizer prescriptive requirements in **Section 140.4(e)** are applicable to systems, other than single package air-cooled commercial unitary air conditioners and heat pumps, with cooling capacity less than 54,000 Btu/h.

Can the design capacity be used to avoid installing an economizer per Section 140.4(e) of the 2022 Energy Code if the actual total design cooling capacity of the unit is only 31,000 Btu/hr but the equipment rated cooling capacity is 36,000 Btu/hr?

No. The total design capacity is the total rated capacity of the equipment. Per **Section 140.4(e)** each cooling air handler that has a design total mechanical cooling capacity over 33,000 Btu must comply with economizer prescriptive requirements unless it meets an exception. Consider the performance approach to model this project to trade-off the economizer requirements with other efficiencies.

Demand Response Noncritical Zones

Is a grocery store with zonal HVAC direct digital controls considered a noncritical zone that needs to meet the demand responsive requirements in Section 110.12(b) of the 2022 Energy Code?

Yes. HVAC systems with zonal direct digital controls in noncritical zones are required to have the capability to receive demand response signals per **Section 110.12(b)** of the 2022 Energy Code. The Energy Code **Section 100.1(b)** defines a critical zone as a zone serving a process where a reset of the zone temperature setpoint during a demand shed event might disrupt the process, including but not limited to computer rooms, data centers, telecom and private branch exchange rooms, and laboratories. Grocery stores do not meet the definition of a critical zone and would be considered a noncritical zone. Demand responsive controls would automatically reduce the energy load when a demand response signal is received if the building is signed up to participate in the utility's demand response program.

Nonresidential Fan Alterations

Do altered fans need to meet the fan energy index requirements in Section 120.10 of the 2022 Energy Code?

No. Per **Section 141.0(b)1D** alterations to fans do not need to meet the fan energy index requirements in **Section 120.10**. However, if the alteration includes any new or replacement fans, the new or replacement fans need to meet the fan energy index requirements in **Section 120.10**.

Nonresidential Lighting Alterations

Does removing a lighting fixture trigger the nonresidential lighting alteration requirements in Section 141.0(b)2I of the 2022 Energy Code?

No. Removing one lighting fixture with no other work being done, would not trigger any Energy Code lighting or control requirements.

Single-Family Water Heating Alternatives

Can a project show compliance with the 2019 Energy Code if the heat pump water heater that was modeled is no longer available for sale in California?

Yes. Projects that used the 2019 Energy Code software where the heat pump water heater model shown on the CF1R-PRF is no longer available for sale can demonstrate compliance by installing a heat pump water heater that meets the requirements of NEEA Advanced Water Heater Specification in the same tier or higher. The volume of the water heater shall be the same or larger than the original model on the CF1R. The final version of CBECC-Res 2019.2.0 was approved September 8, 2021 for demonstrating performance compliance for low-rise residential projects.

FOR MORE INFORMATION

Energy Code Support Center: www.energy.ca.gov/energy-code-support-center

Home Energy Rating System (HERS): www.energy.ca.gov/HERS

Acceptance Test Technician Certification Provider Program (ATTCP): www.energy.ca.gov/ATTCP

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CALIFORNIA ENERGY COMMISSION

EFFICIENCY DIVISION

In This Issue

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Nonresidential and Multifamily Water Chiller Packages

The 2022 Energy Code lists efficiency requirements for water chiller packages in **Table 110.2-D**. This table separates equipment by type and size. Equipment type is categorized as water or air-cooled, which refers to the method used for cooling the refrigerant in the condenser. Per the prescriptive requirements in **Section 140.4(i)** and **Section 170.2(c)4G**, chillers must meet the efficiency requirements shown in the Path B Efficiency column.

The exceptions are:

- Chillers with an electrical service greater than 600 volts
- Chillers attached to a heat recovery system with a design heat recovery capacity greater than 40% of the design chiller cooling capacity
- Chillers used to charge thermal energy storage systems where the charging temperature is less than 40 degrees Fahrenheit
- In a building with more than three chillers, only three chillers are required to meet path B efficiencies

In addition, the Energy Code provides a prescriptive requirement for chilled water plants in **Section 140.4(j)** and **Section 170.2(c)4H**. No more than 300 tons of cooling for a chilled water plant can be provided by air-cooled chillers when using the prescriptive compliance approach. The exceptions are:

- Where the water quality of the building site fails to meet the manufacturer's specifications for the use of water-cooled chillers
- Chillers that are used to charge a thermal energy storage system with a design temperature of less than 40 degrees Fahrenheit
- Nonresidential systems serving healthcare facilities.

New or replacement space-conditioning systems or components, including water chillers, must meet the prescriptive requirements that are applicable to the system or component being altered or replaced. For example, the maximum 300-ton air-cooled chiller requirement in **Section 140.4(j)** and **Section 170.2(c)4H** only applies to HVAC alterations when additional cooling tower tonnage is added to

an existing chilled water plant or when an entirely new or an entire replacement chilled water plant is installed. The 300-ton air-cooled chiller limitation does not apply to HVAC alterations where existing tonnage of an existing chilled water plant is replaced (no new tonnage, not an entirely new system). For more information, please see the **Nonresidential Compliance Manual Chapter 4**.

Updated Lighting Videos

Newly updated 2022 Energy Code lighting videos have been added to the **Lighting webpage**.

Residential

- Overview of High Efficacy Lighting

Nonresidential

- Introduction to Lighting Control Systems
- Introduction to Lighting Controls Acceptance Testing
- Introduction to Lighting Alterations
- Outdoor Lighting and Sign Control Requirements

The videos were developed by the California Lighting Technology Center at UC Davis with funding from Southern California Edison, in collaboration with RMS Energy Consulting, LLC, and the California Energy Commission.

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HOURS 8 a.m.–12 p.m. and 1 p.m.–4:30 p.m.

New Training Presentations

New training presentations for the 2022 Energy Code are available on the Online Resource Center.

Envelope webpage

- 2022 Single-Family Envelope
- 2022 Multifamily Envelope
- 2022 Nonresidential Envelope

HVAC webpage

- 2022 Single-Family HVAC Overview
- 2022 Multifamily HVAC Overview
- 2022 Nonresidential HVAC Overview

Lighting webpage

- 2022 Single-Family Lighting Overview
- 2022 Multifamily Indoor Lighting Overview
- 2022 Multifamily Outdoor Lighting Overview
- 2022 Multifamily Sign Lighting Overview
- 2022 Nonresidential Indoor Lighting Overview
- 2022 Nonresidential Outdoor Lighting Overview
- 2022 Nonresidential Sign Lighting Overview

Online Fact Sheets Updated

The online fact sheets have been updated with frequently asked questions on the **Solar PV, Solar Ready, Battery, and Electric-Ready webpage**.

- Low-Rise Multifamily Solar PV
- High-Rise Multifamily Solar PV
- High-Rise Multifamily Battery Storage Systems
- Nonresidential Solar PV
- Nonresidential Battery Storage Systems
- Single-Family Solar PV
- Single-Family ESS-Ready

Energy Code Support Center

In response to stakeholder feedback, the **Online Resource Center webpage** will soon get a new name and look along with the launch of an intake form for Energy Code Hotline inquiries.

ASHRAE Resources

The Energy Code includes requirements that refer to the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) Standards. Read-only versions of ASHRAE Standards are available on the **ASHRAE website**.

Q&A

Nonresidential Chiller Alterations

Does a project with a 900-ton air-cooled heat pump plant on the roof, consisting of several 4-pipe heat pump heat recovery modular chillers that will provide heating and cooling to the building meet the 2022 Energy Code prescriptive requirements?

No. Per **Section 140.4(j)** chilled water plants shall not have more than 300 tons provided by air-cooled chillers. The remaining capacity must be water-cooled chillers since they are more efficient than air-cooled chillers. Consider the performance approach to model this project to trade-off the air-cooled limitation with other efficiencies.

If a facility has separate chilled water systems serving different spaces, could each system be defined as a standalone plant to meet the prescriptive requirement in Section 140.4(j) for air-cooled chiller capacity limit of 300 tons per each chilled water plant?

Yes. The 300-ton limitation on air-cooled chillers applies to each separate plant, assuming each one is on its own loop, piping, and serving different areas.

Does Section 140.4(j) apply to air-to-water heat pumps?

No. The limitation per **Section 140.4(j)** does not apply unless the space conditioning system has a chiller that is air-cooled.

Does the 300-ton limit on air-cooled chillers in Section 140.4(j) apply to 600 tons of heat recovery chillers with an auxiliary air-cooled coil which operate in cooling only mode, but are intended to provide heating when there is simultaneous load?

Yes. For prescriptive compliance the 300-ton limitation on air-cooled chillers will apply to equipment that has an air-cooled chiller, with an add-on to perform heat recovery. There is not an exception to **Section 140.4(j)** for heat recovery capabilities. Consider the performance approach to model this project to trade-off the air-cooled limitation with other efficiencies.

Does a project replacing two chillers serving computer room air conditioning units with newer 150-ton chillers with a total of 300-tons of cooling need to meet the economizer requirements in Section 140.9(a)1?

No. Replacing the chiller equipment alone does not trigger the economizer requirements in **Section 140.9(a)**.

Nonresidential Electric Resistance Heating

Does replacing all gas-fired equipment with electric boilers in a second-generation tenant improvement meet the prescriptive requirements in Section 140.4 of the 2022 Energy Code?

No. Electric resistance heating is prohibited for space conditioning per **Section 140.4(g)**. The altered HVAC system or component must meet the applicable requirements in **Section 140.4**. However, there are several **exceptions to Section 140.4(g)**. Consider the performance approach to model this project to trade-off the electric resistance heating with other efficiencies.

Solar PV for Campus Projects

Does a campus project need to install PV, if the project includes office, commercial, and an amenity building with a cafe, commercial kitchen, dining area, and a gym with locker rooms?

Yes. Per **Section 140.10(a)** of the 2022 Energy Code newly constructed nonresidential buildings where at least 80% of the floor area is of the building type listed in **Table 140.10-A** must install PV. Also a battery storage system may be required per **Section 140.10(b)**. Nonresidential spaces are generally defined in **Section 100.1(b)**. Although "amenity building" is not listed in **Table 140.10-A**, some of these spaces may

The CEC welcomes feedback on Blueprint. Please contact the editor at **Title24@energy.ca.gov**

fall under restaurant or retail. The building department should confirm the space types of the amenity building.

Multifamily Lighting

Does Reference Joint Appendix JA8 apply to indoor lighting systems in multifamily buildings?

Yes. In multifamily buildings, **JA8** is applicable to dwelling units, but it is not applicable to common areas. In newly-constructed multifamily buildings, dwelling units must meet **Section 160.5(a)** of the 2022 Energy Code. Per **Section 160.5(a)1B** screw based luminaires shall contain lamps that comply with **JA8**. Per **Section 160.5(a)1D** lamps and other separable light sources that are not compliant with the **JA8** elevated temperature requirements, including marking requirements, shall not be installed in enclosed or recessed luminaires. **Table 160.5-A** lists the classification of dwelling unit high luminous efficacy light sources. Common areas must meet **Section 160.5(b)**.

For alterations of an existing multifamily building, per **Section 180.2(b)4A** altered dwelling unit lighting must meet the luminaire efficacy requirements of **Section 160.5(a)** and **Table 160.5-A**. Where existing screw base sockets are present in ceiling-recessed luminaires, removal of these sockets is not required provided that new **JA8** compliant trim kits or lamps designed for use with recessed downlights or luminaires are installed. Common areas must meet **Section 180.2(b)4B**.

Unpermitted ADUs

Does an ADU built 10 years ago without a permit need to comply with Energy Code requirements?

Yes. Per **Section 100.0** of the 2022 Energy Code if the building was not permitted prior and the building permit application is submitted now, then the ADU must meet the applicable Energy Code requirements. The building department should determine how to demonstrate compliance and whether the ADU must comply as a newly-constructed building or as an addition.

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In This Issue

Low-Rise Multifamily Data Registry Update

The California Energy Commission (CEC) approved CalCERTS as a provider of a low-rise multifamily data registry under the 2022 Building Energy Efficiency Standards (Energy Code). Accordingly, **updated enforcement guidance** has been issued regarding Energy Code compliance documentation for low-rise multifamily projects. Authorities having jurisdiction, data registry users, and all other responsible persons should review the **new advisory**, to ensure that permits for low-rise multifamily projects under the 2022 Energy Code are not delayed and the required compliance documents (forms) are registered. See Table 1.

Low-rise multifamily certificates of compliance (LMCC) forms for projects that require field verification and diagnostic testing by a home energy rating system (HERS) rater must be registered with an approved data registry per the 2022 Energy Code **Section 10-103(a)**. All associated low-rise multifamily certificates of installation (LMCI) and low-rise multifamily certificates of verification (LMCV) forms for the project need to be registered as well. The compliance forms do not need to be registered for projects which do not require field verification and diagnostic testing by a HERS rater, including certain alterations and additions to existing multifamily buildings.

Developments for the CHEERS low-rise multifamily data registry application and approval will appear on the **docket 22-HERS-01**. For more information, please visit the **Home Energy Rating System Program - HERS webpage** and the **2022 Energy Code webpage**.

Low-rise multifamily data registry provider	New permit applications submitted on or after February 15, 2024	Partially completed projects with permit application submitted prior to February 15, 2024	Completed projects with permit applications submitted prior to February 15, 2024
CalCERTS	LMCC forms required to be registered in an approved low-rise multifamily data registry	Register all forms, including manually completed forms to the CalCERTS low-rise multifamily data registry	Register manually completed forms to the CalCERTS low-rise multifamily data registry
CHEERS	Not available until the CHEERS low-rise multifamily data registry is approved	Continue working with manually completed forms until the CHEERS low-rise multifamily data registry is approved	Retain forms until the CHEERS low-rise multifamily data registry is approved, at which time forms must be registered

Table 1: Low-rise multifamily data registry guidance for projects at different stages

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New Online Fact Sheets

The CEC has introduced a new style of online fact sheets for the 2022 Energy Code. These online fact sheets are interactive guides that have links to the related Energy Code sections and other resources. Topics addressed includes solar photovoltaic (PV), battery storage, energy storage system (ESS) ready, and electric-ready.

These online fact sheets are available via the Online Resource Center (ORC) **Solar PV, Solar Ready, Battery, and Electric-Ready webpage**

- High-Rise Multifamily Solar PV
- Low-Rise Multifamily Solar PV
- Nonresidential Solar PV
- Single-Family Solar PV
- High-Rise Multifamily Battery Storage Systems
- Nonresidential Battery Storage Systems
- Single-Family ESS-Ready
- Multifamily Electric-Ready
- Single-Family Electric-Ready

New Presentations on the ORC

Four new training presentations for the 2022 Energy Code are available on the Online Resource Center **Commissioning webpage** and the **Solar PV, Solar Ready, Battery, and Electric-Ready webpage**

- Commissioning
- Single-Family PV, Solar-Ready, ESS-Ready, and Electric-Ready
- Multifamily PV, Solar-Ready, Battery, and Electric-Ready
- Nonresidential PV, Solar-Ready and Battery

Q&A

Battery Storage Capacity

Can the battery storage nameplate capacity be used in Equation 140.10-B to determine the sizing requirements of the 2022 Energy Code Section 140.10(b)?

No. For compliance with the Energy Code the rated usable energy capacity of the battery

storage system in kWh must be used for **Equation 140.10-B**. The usable capacity is the battery energy storage capacity in kWh that a manufacturer allows to be used for charging and discharging.

To comply with **Section 140.10(b)** a battery storage system must meet the minimum qualification requirements of **Reference Joint Appendix JA12** which includes having a usable capacity of at least 5 kWh and an energy capacity retention of 70 percent of nameplate capacity after 4,000 cycles covered by a warranty, or 70 percent of nameplate capacity under a 10-year warranty.

Solar and Battery Equipment Lists

Do battery storage systems and energy storage systems need to be certified to the CEC to comply with Reference Joint Appendix JA12 requirements of the 2022 Energy Code?

Yes. The battery storage system is self-certified by the manufacturer to the CEC to meet the **JA12 qualifications** to comply with applicable prescriptive and performance requirements in the Energy Code. For more information, please visit the manufacturer certifications of building equipment **Battery and Energy Storage Systems webpage**.

Does the CEC have solar equipment lists for PV modules, inverters (including smart inverters), meters, battery, and energy storage systems?

Yes. The Solar Equipment Lists Program includes equipment that meets established national safety and performance standards. These lists provide information and data that support existing solar incentive programs, utility grid connection services, consumers, and state and local programs.

Please note that equipment on the CEC's Solar Equipment Lists have reportedly undergone tests to achieve minimum safety and performance standards. The CEC makes no claim or warranty on the equipment and its safety, performance, or durability. For more information, please visit the **solar equipment lists webpage**.

Community Shared Solar

Can a newly constructed single-family project meet the solar PV requirements of the 2022 Energy Code Section 150.1(c)14 using a community shared solar generation system?

Yes. **Section 150.1(c)14** allows the use of an approved community shared solar generation system instead of installing solar PV panels on the building.

Are there any approved community shared solar generation systems that comply with the 2022 Energy Code Section 10-115?

Yes. The CEC approved the Sacramento Municipal Utility District (SMUD) as an administrator of a community shared solar generation system. This program is available to newly constructed low-rise residential projects in the SMUD service area. For more information, please visit the **docket 22-BSTD-06**.

Are there other service areas with an approved community shared solar generation system?

No. Currently there are no other approved community shared solar generation system administrators.

Any entity may apply to serve as an administrator of a proposed community shared solar electric generation system, including but not limited to utilities, builders, solar companies, or local governments. For more information on the requirements, please visit the 2022 Energy Code **Section 10-115**, the 2022 Single-Family Compliance Manual **Chapter 7.4**, and the 2022 Nonresidential and Multifamily Compliance Manual **Chapter 9.4**.

For additional help with the Energy Code, see Energy Code Ace's **online offerings** of trainings, tools, and resources.

Energy Use Intensity Reporting

If the performance report (CF1R-PRF-01, NRCC-PRF-01, or LMCC-PRF-01) shows negative values for the energy use intensity (EUI) can the project still comply with the Energy Code?

Yes. The EUI is not used to determine compliance with the Energy Code and should be disregarded during the plan review process. Single-family compliance is based on the source energy design rating (EDR1), efficiency energy design rating (Efficiency EDR2), and total energy design rating (Total EDR2). Nonresidential and Multifamily compliance is based on time dependent valuation (TDV) and source energy.

Nonresidential Unconditioned Spaces

Do the requirements of the 2022 Energy Code Section 120.1(c)4 for exhaust ventilation rates per Table 120.1-B apply to unconditioned spaces?

No. Per the 2022 Energy Code **Section 100.0(e)** the requirements of Sections 120.0 through 140.8 apply to newly constructed nonresidential buildings, hotels and motels that are mechanically heated or mechanically cooled. Newly constructed unconditioned nonresidential buildings must comply with Sections 110.9, 110.10, 120.6, 130.0 through 130.5, 140.3(c), 140.6, 140.7, and 140.8. Additionally, Sections 100.0 through 110.12 apply to all buildings covered by **Section 100.0(a)**. For more information, please see **Table 100.0-A** of the 2022 Energy Code.

FOR MORE INFORMATION

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CALIFORNIA ENERGY COMMISSION

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CALIFORNIA ENERGY COMMISSION

EFFICIENCY DIVISION

In This Issue

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2025 Energy Code Update: Draft Regulations

The **2025 Energy Code** will improve upon the 2022 Energy Code by updating energy efficiency standards for newly constructed buildings, additions, and alterations to existing buildings, consistent with state and federal law. During pre-rulemaking California Energy Commission (CEC) staff evaluated proposed revisions to the 2025 Energy Code and prepared draft regulations (known as **Express Terms**). During the rulemaking in 2024, the CEC will have 45-day and 15-day public comments periods. The final 2025 Energy Code language will be proposed for adoption after the public comment periods in 2024 for an anticipated publication in 2025, with an effective date of January 1, 2026.

Summary of Staff Proposed Changes

- Introduces heat pump standards for existing single-family homes and for designated types of existing nonresidential buildings
- Updates heat pump standards for newly constructed single-family, multifamily, and designated types of nonresidential building
- Updates photovoltaic system standards for newly constructed buildings
- Updates energy storage standards for high-rise multifamily, nonresidential, and hotel and motel buildings
- Increases envelope efficiency standards
- Increases space conditioning system efficiency and control standards
- Improves indoor air quality requirements for multifamily buildings
- Improves efficiency standards for multifamily domestic water heating systems
- Establishes electric-ready requirements for multifamily domestic water heating systems
- Simplifies standards for multifamily buildings
- Increases efficiency requirements for pool and spa water heating systems

- Increases daylighting control requirements for nonresidential buildings
- Increases efficiency standards for laboratories
- Increases efficiency requirements for controlled environment horticulture buildings
- Increases efficiency requirements for nonresidential refrigeration systems
- Establishes industrial pipe insulation requirements
- Establishes electric-ready requirements for commercial kitchens
- Makes general improvements to the clarity and consistency of existing provisions
- Relocates portions of the Alternative Calculation Method Approval Manual pertaining to the application, approval, updates, expiration, and decertification of third-party compliance software to Title 24, Part 1
- Relocates field verification and diagnostic testing requirements from Title 20 to Title 24, Part 1

Preliminary rulemaking materials including technical reports and data gathered to substantiate the proposed measures can be found on CEC **docket 22-BSTD-01**. The formal rulemaking is scheduled to begin in the first quarter of 2024.

The CEC encourages public participation in its proceedings. Participants may attend the workshops to provide verbal comments, or written comments can be submitted to the rulemaking docket. For more information visit the **2025 Energy Code webpage**.

2022 Energy Code: Daylighting with Linear Fixtures

The 2022 Energy Code **§ 130.1(d)2** updates the automatic daylighting control requirements for linear lighting systems. Linear LED and other solid state lighting (SSL) linear light sources may be treated as linear lamps in increments of 4-foot segments or smaller, and each segment is separately controlled based on the type of the daylit zone in which the segment is primarily located. The intent is to allow 4-foot segments for linear lighting that span daylit zones, so that the lighting can be separately controlled in each daylit zone.

For general lighting luminaires located in overlapping skylit daylit zones and sidelit daylit zones, the luminaire shall be controlled as part of the skylit daylit zone. The luminaire may be partially in the daylit zone and it is still to be controlled as the skylit zone.

Similarly for general lighting luminaires located in overlapping primary sidelit daylit zones and secondary daylit zones, the luminaire shall be controlled as part of the primary sidelit daylit zone. The luminaire may be partially in the secondary daylit zone and it is still to be controlled as part of the primary sidelit daylit zone.

Previous **Blueprint Issue 130** stated per the 2019 Energy Code luminaires that are at least 50 percent in a daylit zone must be included in the zone and meet applicable control requirements for that zone, which no longer applies under the 2022 Energy Code.

2022 Compliance Software

Recently approved updated versions of the 2022 Energy Code compliance software are available on the **2022 Energy Code compliance software webpage**.

- For single-family buildings
  - Right-Energy Title 24 2022.3.0
- For nonresidential and multifamily buildings
  - IES VE Title 24 2022 1.1

All permit applications submitted on or after January 1, 2023, must comply using software and compliance forms approved for the 2022 Energy Code. Visit the **compliance software webpage** for all of the approved software and the expiration dates.

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New Resources on the ORC

Twelve new covered processes fact sheets for the 2022 Energy Code are available on the Online Resource Center **covered processes webpage**.

- Commercial Kitchens
- Commercial Refrigeration
- Compressed Air Systems
- Computer Room and Data Centers
- Controlled Environment Horticulture
- Elevators
- Enclosed Parking Garages
- Escalators and Moving Walkways
- Laboratory and Factory Exhaust
- Process Boilers
- Refrigerated Warehouses
- Steam Traps

Q&A

Single-Family Energy Storage System (ESS) Ready

Can the 2022 Energy Code ESS ready requirement be met without a subpanel?

Yes. Per **§ 150.0(s)1A** ESS ready interconnection equipment is required to have a 60-Amp backed-up capacity and a minimum of four ESS-supplied branch circuits. See Figure 1. Various configurations of panels and subpanels could meet the ESS-ready requirements of **§ 150.0(s)**.

Can a smart panel meet the ESS ready requirements in § 150.0(s)?

Yes. Per **§ 100.1** ESS ready interconnection equipment is defined as equipment, including but not limited to an ESS ready panelboard, that can accommodate the connection of a distributed energy resource or an ESS capable of either automatic or manual isolation from the utility power source. An ESS-ready panelboard is defined as a panelboard that can accommodate either automatic or manual switching between a utility power source to a distributed energy resource or an energy storage system, such as a split bus panelboard.

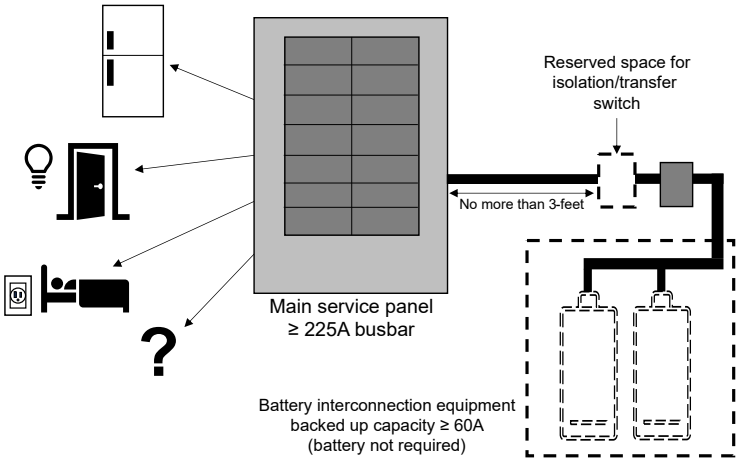

Figure 1: Example of ESS-ready per 150.0(s)1A

Instantaneous Electric Point-of-Use Water Heaters

Can more than one instantaneous electric point-of-use (POU) water heater be used prescriptively per the 2022 Energy Code meet exception 2 to § 150.1(c)8 for single-family new construction?

No. The prescriptive requirement for single-family new construction specifies an instantaneous electric point-of-use water heater may be used when the requirements of **Reference Residential Appendix RA4.4.5** are met. Under the performance approach multiple water heaters may be modeled, however the design will be compared to the efficiency of the prescriptive standard design.

Can more than one instantaneous electric POU water heater be used prescriptively per § 150.2(a)1Div for single-family additions that are 500 square feet or less?

No. Per the prescriptive requirement when a second water heater is installed to serve a single-family addition that is 500 square feet or less an electric point-of-use water heater may be used. Under the performance approach multiple water heaters may be modeled, however the design will be compared to the efficiency of the prescriptive standard design.

Can the instantaneous electric POU water heater serve more than one fixture?

Yes. When the requirements of **Reference Residential Appendix RA4.4.5** are met. The POU water heater pipe runs should meet Table 4.4.5 for pipe diameter and length requirements and take the most direct path. The the manufacturer's installation specifications for the number of fixtures served should also be considered.

Does a 10-foot water heater pipe run meet point of use requirements per RA4.4.5?

Yes. A 10-foot pipe run could meet **RA4.4.5** length requirements depending on the pipe diameter. For example, RA4.4.5 allows up to 15-feet of 3/8-inch pipe, or 10-feet of 1/2-inch pipe. If a combination of piping is used in a single run then one half the allowed length of each size is the maximum installed length.

Multifamily Fenestration NA6 Calculations

Are multifamily projects allowed to use the fenestration default calculations in Reference Nonresidential Appendix NA6 per § 110.6 of the 2022 Energy Code?

Yes. The NA6 default calculations can be used for U-factor, solar heat gain coefficient (SHGC), and visible transmittance (VT) per **exception 3 to § 170.2(a)3Aii** for multifamily projects. NA6 allows low-rise multifamily default calculations for new, altered, and replacement vertical windows and skylights with less than 250 square feet of area. NA6 allows high-rise multifamily default calculations for new, altered, and replacement skylights with less than 200 square feet of area. Vertical windows in high-rise multifamily projects may not use the NA6 calculations and must use the default values in **§ 110.6**.

The CEC welcomes feedback on Blueprint. Please contact the editor at **Title24@energy.ca.gov**

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EFFICIENCY DIVISION

In This Issue

California HERS Program Update

The California Home Energy Rating System (HERS) Program is an integral part of the state's efforts to advance energy efficiency and reduce greenhouse gas emissions. The California HERS Program relies on Raters and Providers to ensure various features of a home meet regulations in Title 24, Part 6 (Energy Code) and Title 20, sections 1670-1675, of the California Code of Regulations. Raters verify compliance in the field, conduct home energy audits, and produce California Whole-House Home Energy Ratings. Providers are approved by the California Energy Commission (CEC) to train, certify, and oversee the many Raters operating in the state. Providers also maintain data registries where residential compliance documents are stored for review by various stakeholders. California Field Verification and Diagnostic Testing and California Whole-House Home Energy Ratings are the two separate residential energy efficiency compliance services covered by the California HERS Program.

California Field Verification and Diagnostic Testing

This service is required to verify compliance with aspects of the Energy Code in the field and requires registering compliance documents (CF1R, CF2R, and CF3R) so important compliance data can be collected. Often referred to as HERS verification, this service is completed by a certified Rater and overseen by a CEC-approved Provider. CalCERTS and CHEERS remain approved by the CEC as Providers in good standing for Field Verification and Diagnostic Testing services.

California Whole-House Home Energy Ratings

This voluntary service allows homeowners to hire a certified Rater to assess their home's energy efficiency and provide recommendations for cost-effective upgrades. A Rater conducts a home energy audit to produce a California Whole-House Home Energy Rating. This service is similarly overseen by a CEC-certified Provider through a separate regulatory process in Title 20, sections 1670-1675. It is unlawful to advertise

or purport to operate California Whole-House Home Energy Rating services as CEC-certified when no such services have been certified or approved by the CEC.

Some national programs use "HERS" as a generic term for home energy rating systems. These programs are distinct from state-specific California Whole-House Home Energy Rating services. National incentive programs, rating programs (such as Leadership in Energy and Environmental Design), and Environmental, Social, and Governance (ESG) benchmarking using national home energy rating systems are out of the scope of the California Code of Regulations and remain permissible.

Future of the California HERS Program

To help improve administration of the California HERS Program, the CEC is pursuing three separate rulemaking proceedings. The first amends Title 20 to remove administrative provisions related to mandatory Field Verification and Diagnostic Testing. This will help consolidate the Field Verification and Diagnostic Testing requirements with the Energy Code. The second rulemaking aims to add the limited administrative requirements for the Field Verification and Diagnostic Testing program to Title 24, along with other programmatic updates. The Field Verification and Diagnostic Testing administrative requirements will be removed from Title 20 on the same date that they will go into effect in Title 24, such that the regulations will be in effect, albeit in a different location, with no interruption. Starting with the 2025 Energy Code, updates to Field Verification and Diagnostic Testing requirements will occur every three years when the Energy Code is updated. The third rulemaking will seek to update the regulations for voluntary California Whole-House Home Energy Ratings. The California Whole-House Home Energy Ratings regulations are expected to remain in Title 20. For more information visit the **HERS Program webpage**.

Low-Rise Multifamily Data Registry Update

To date, a low-rise multifamily data registry has not been approved by the CEC for use with the 2022 Energy Code. As a result, applicants have not yet been able to register compliance documents for low-rise multifamily projects. Approved HERS Providers are continuing to work diligently to develop low-rise multifamily data registries, with the goal of submitting registries to the CEC for review and approval by the fourth quarter of 2023. Until a low-rise multifamily data registry is approved by the CEC, the **regulatory advisory** issued November 18, 2022, is still in effect. For more information visit the **HERS Program webpage**.

ENERGY STANDARDS HOTLINE

Available to help with Energy Code (Title 24, Part 6) questions.

✉ EMAIL
title24@energy.ca.gov

☎ CALL
800-772-3300 Toll free in CA
916-654-5106 Outside CA

HOURS 8 a.m.–12 p.m. and 1 p.m.–4:30 p.m.

2022 Compliance Software

Approved updated versions of the 2022 Energy Code compliance software are available on the **2022 Energy Code compliance software webpage**.

- For single-family buildings
  - CBECC-Res 2022.3.0
  - EnergyPro 9.2
- For nonresidential and multifamily buildings
  - CBECC 2022 3.0
  - EnergyPro 9.2

All permit applications submitted on or after January 1, 2023, must comply using software and compliance forms approved for the 2022 Energy Code. Visit the **compliance software webpage** for the latest versions of the software and software expiration dates.

CF1R Special Circumstances

The single-family certificate of compliance (CF1R) is submitted at permit application to ensure the requirements of the Energy Code are being met. The CEC allows compliance by either a prescriptive or a performance method. Performance compliance uses computer-modeling software to trade-off efficiency measures. The CEC has established alternate modeling assumptions for special features. When a building has special features the standard design features will differ from the proposed design, so the building receives appropriate credit for its efficiency. When measures require verification by a HERS rater or are designated as a special feature, the specific requirement is listed on the CF1R. Figure 1.

Checking both the required special features and the HERS features summary section of the CF1R ensures that the efficiency items that received compliance credits are installed and HERS verified as applicable. If a project modeled a special feature and does not install it, then the compliance report should be rerun to ensure the building is still in compliance without the special feature credit.

For more information on the special features see the 2022 Residential Alternative Calculation Method (ACM) **Reference Manual and Appendix A: Special Features**.

New Resources on the ORC

New resources for the 2022 Energy Code are available on the Online Resource Center **envelope webpage** and the **water heating webpage**.

- 2022 air sealing fact sheet
- 2022 single-family, multifamily, and nonresidential cool roof brochures
- 2022 single-family, multifamily, and nonresidential water heating presentations

2022 Energy Code Index

The index for the **2022 Energy Code** has been published. The index is a separate PDF document that can be viewed and downloaded on the **2022 Energy Code webpage**.

CERTIFICATE OF COMPLIANCE - RESIDENTIAL PERFORMANCE COMPLIANCE METHOD **CF1R-PRF-01E**

Project Name: Sample ADU Addition **Calculation Date/Time:** 2023-07-28T07:53:50-07:00 **(Page 4 of 9)**

Calculation Description: **Input File Name:** Sample ADU Addition.ribd22

ENERGY USE INTENSITY

	Standard Design (kBtu/ft^2 - yr)	Proposed Design (kBtu/ft^2 - yr)	Compliance Margin (kBtu/ft^2 - yr)	Margin Percentage
Gross EUI[1]	43.93	43.47	0.46	1.05
Net EUI[2]	43.93	43.47	0.46	1.05

Notes
1. Gross EUI is Energy Use Total (not including PV) / Total Building Area.
2. Net EUI is Energy Use Total (including PV) / Total Building Area.

REQUIRED SPECIAL FEATURES

The following are features that must be installed as condition for meeting the modeled energy performance for this computer analysis.

- Variable capacity heat pump compliance option (verification details from VCHP Staff report, Appendix B, and RA3)
- Electric water heater exception - Exception 2 to Section 150.1(c)8
- Point of use

HERS FEATURE SUMMARY

The following is a summary of the features that must be field-verified by a certified HERS Rater as a condition for meeting the modeled energy performance for this computer analysis. Additional detail is provided in the building tables below. Registered CF2Rs and CF3Rs are required to be completed in the HERS Registry

- Indoor air quality ventilation
- Kitchen range hood
- Verified Refrigerant Charge
- Airflow in habitable rooms (SC3.1.4.1.7)
- Verified heat pump rated heating capacity
- Wall-mounted thermostat in zones greater than 150 ft2 (SC3.4.5)
- Ductless indoor units located entirely in conditioned space (SC3.1.4.1.8)

ZONE INFORMATION

01	02	03	04	05	06	07
Zone Name	Zone Type	HVAC System Name	Zone Floor Area (ft^2)	Avg. Ceiling Height	Water Heating System 1	Status
ADU Zone	Conditioned	HVAC System	408	9	DHW System	New

Registration Number: Registration Date/Time: HERS Provider:

CA Building Energy Efficiency Standards - 2022 Residential Compliance Report Version: 2022.0.000 Schema Version: rev 20220901 Report Generated: 2023-07-28 07:53:59

Figure 1: Example CF1R required special features and HERS features summary

New Resource Hub

The Energy Resource Hub provides links for guidance, best practices, rebates and loans to assist with decarbonizing buildings and installing electric vehicle charging equipment in residential and commercial buildings. Each page includes a comprehensive list for homeowners and renters, contractors, and local governments. For more information please visit the **building and home energy resource hub webpage**.

CalAPP Program Grants

The California Automated Permit Processing (CalAPP) program application deadline has been extended to May 1, 2024. Visit the **CalAPP program webpage** for program documents, common questions, and the application form.

CalEHP Program Grants

The CEC California Electric Homes Program (CalEHP) provides incentives for the construction of all-electric market-rate residential buildings and installation of energy storage systems to encourage deployment of near-zero-emission building technologies. For more information visit the **CalEHP webpage**.

IRA Rebate Program in CA

The federal Inflation Reduction Act (IRA) includes two residential energy rebate programs and funding for contractor training grants related to these programs. More than $582 million is anticipated to be allocated to California for the whole-house Homeowner Managing Energy Savings (HOMES) rebate program and the point-of-sale High-Efficiency Electric Home Rebate (HEEHRA) program. For more information visit the **IRA Residential Energy Rebate Programs in California webpage**.

For additional help with the Energy Code, see Energy Code Ace's **online offerings** of trainings, tools, and resources.

Q&A

Single-Family Unconditioned Spaces

Do the Energy Code requirements apply to detached unconditioned buildings on residential lots?

Yes. Per the Energy Code scope in **§ 100.0(c)** all unconditioned spaces must comply with the lighting requirements of Part 6. Other single-family requirements of the Energy Code generally do not apply to detached unconditioned buildings on a residential lot.

However, attached unconditioned spaces that separate conditioned spaces from unconditioned spaces, such as attics, garages, crawl spaces, utility rooms, etc., will need to meet the Energy Code requirements.

Nonresidential Fenestration NA6 Calculations

Are the fenestration default calculations in Reference Nonresidential Appendix NA6 only for skylights per § 110.6 of the 2022 Energy Code?

Yes. The NA6 default calculations are only for new, altered, and replacement skylights in nonresidential buildings. Skylights with less than 200 square feet of area may use the NA6 default calculations for U-factor, solar heat gain coefficient (SHGC), and visible transmittance (VT) per **§ 110.6**. Vertical windows in nonresidential buildings may not use the NA6 calculations.

Default Values for Doors

Can a default label be used for an exterior door that is not rated by the National Fenestration Rating Council (NFRC)?

Yes. The U-factor values for an unrated exterior door default label can be found in the **Reference Joint Appendix JA4.5 Table 4.5.1**. Figure 2.

The CEC welcomes feedback on Blueprint. Please contact the editor at **Title24@energy.ca.gov**

Table 4.5.1 – Doors

Description		U-factor
		A
Uninsulated single-layer metal *swinging doors* or *non-swinging doors*, including single-layer uninsulated access hatches and uninsulated smoke vents:	1	1.45
Uninsulated double-layer metal *swinging doors* or *non-swinging doors*, including double-layer uninsulated access hatches and uninsulated smoke vents:	2	0.70
Insulated metal *swinging doors*, including fire-rated *doors*, insulated access hatches, and insulated smoke vents:	3	0.50
Wood *doors*, minimum nominal thickness of 1-3/4 in. (44 mm), including panel *doors* with minimum panel thickness of 1-1/8 in. (28 mm), and solid core flush *doors*, and hollow core flush *doors*:	4	0.50
Any other wood *door*:	5	0.60
Uninsulated single layer metal *roll up doors* including fire rated *door*	6	1.45
Insulated single layer metal *sectional doors,* minimum insulation nominal thickness of 1-3/8 inch; expanded polystyrene (R-4 per inch).	7	0.179
Source: ASHRAE 90.1-2007, Section A7.		

Figure 2: JA4 Table 4.5.1 Door default values

FOR MORE INFORMATION

Online Resource Center (ORC): www.energy.ca.gov/orc

Home Energy Rating System (HERS): www.energy.ca.gov/HERS

Acceptance Test Technician Certification Provider Program (ATTCP): www.energy.ca.gov/ATTCP

2022 Approved Compliance Software: https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2022-building-energy-efficiency-1

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CALIFORNIA ENERGY COMMISSION

CEC-400-2023-010

Issue 142 | April - June 2023

BLUEPRINT

CALIFORNIA ENERGY COMMISSION
EFFICIENCY DIVISION

In This Issue

The CEC welcomes feedback on Blueprint. Please contact the editor at **Title24@energy.ca.gov**

Covered Process or Process Space

A covered process is different than a process space. Both need to be understood to meet the Energy Code requirements.

Covered processes are regulated under the 2022 Energy Code **§ 120.6**, **§ 140.9**, and **§ 141.1**. These processes include specific efficiency requirements for computer rooms, data centers, elevators, escalators and moving walkways, laboratories, enclosed parking garages, commercial kitchens, refrigerated warehouses, commercial refrigeration, compressed air systems, process boilers, steam traps, and controlled environment horticultural spaces.

Process space is a space that is controlled to maintain temperatures below 55 degrees Fahrenheit or above 90 degrees Fahrenheit. Spaces that are maintained within the temperature range of 55 degrees Fahrenheit to 90 degrees Fahrenheit are considered conditioned spaces.

Directly and indirectly conditioned spaces with a covered process must meet all applicable Energy Code requirements including:

- Covered process
- Envelope
- Lighting
- Mechanical
- Power distribution
- Solar PV and battery storage
- Water heating

If the equipment serves both conditioned space and process space, the equipment must meet the requirements in **§ 110.2**, unless the equipment meets specific exceptions in the Energy Code or has specific efficiency requirements stated in **§ 120.6**, **§ 140.9**, or **§ 141.1**. The mandatory requirements for space conditioning equipment in **§ 110.2** do not apply to equipment used solely for process space.

Buildings that use only an evaporative cooler (swamp cooler) for space conditioning must meet all the applicable requirements for unconditioned nonresidential buildings, which primarily consist

of lighting, power distribution, and applicable covered process requirements. Cooling of a space by direct or indirect evaporation of water alone is not considered mechanical cooling.

For more information on covered processes, see the **Nonresidential and Multifamily Compliance Manual Chapter 10**.

Compliance Software

Approved updated versions of the 2022 Energy Code compliance software are available on the **2022 Energy Code compliance software webpage**.

- For single-family buildings
  - Right-Energy Title 24 2022.2.0
- For nonresidential and multifamily buildings
  - IES VE Title 24 2022.1.0

All permit applications submitted on or after January 1, 2023, must comply using software and compliance forms approved for the 2022 Energy Code. Please visit the **compliance software webpage** for the latest versions of the software and software expiration dates.

New Resources on the ORC

New presentations for the 2022 Energy Code are available on the **Online Resource Center overview webpage**.

- 2022 Single-Family Significant Changes
- 2022 Multifamily Significant Changes
- 2022 Nonresidential Significant Changes

2022 Compliance Manual Errata

The first errata for the **2022 Single-Family Residential Compliance Manual** and the **2022 Nonresidential and Multifamily Compliance Manual** have been published.

These errata address revisions to the compliance manuals, including minor changes to correct grammatical errors, clarify meaning, and clean up confusing language. View the errata on the **2022 Energy Code webpage**.

Q&A

Single-Family Energy Storage System Ready

Do the energy storage system (ESS) ready requirements in § 150.0(s) apply to duplexes?

Yes. The 2022 Energy Code ESS ready requirements in **§ 150.0(s)** apply to all single-family residences that include one or two dwelling units.

Will both duplex units need to meet the Energy Code requirements separately?

Yes. Duplexes are considered two single-family homes. Each duplex unit would have a separate panel with 225A busbar rating to meet the ESS ready mandatory requirements in **§ 150.0(s)**.

Do the ESS ready requirements in § 150.0(s) apply to townhouses?

No. Per the definition in **§ 100.1** a townhouse is a single-family dwelling unit constructed in a group of three or more attached units. Townhouses do not need to meet the ESS ready requirements in **§ 150.0(s)**.

Single-Family Solar PV

Does the prescriptive exception 2 to § 150.1(c)14 for solar PV apply when using performance modeling software?

Yes. The performance modeling software allows exception 2 to **§ 150.1(c)14**. Per the 2022 Single-Family Residential ACM Reference Manual, no PV system is required when

the minimum PV system size is less than 1.8 kWdc as specified by **§ 150.1(c)14,** which uses **Equation 150.1-C** to determine the required minimum PV system size.

Capture Efficiency Ratings

Can capture efficiency ratings be used instead of the airflow rate to comply with ventilation requirements per the single-family Table 150.0-G and the multifamily Table 160.2-G?

Not at this time. The verification testing for the capture efficiency ratings per ASTM E3087 is still underway. The 2022 Energy Code includes the capture efficiency ratings since the ASTM values are expected to be available before the end of this code cycle.

For additional help with the Energy Code, see Energy Code Ace's **online offerings** of trainings, tools, and resources.

Nonresidential Economizers

Is there a prescriptive trade-off for economizers per § 140.4(e)1 of the 2022 Energy Code?

Yes. Exception 4 to **§ 140.4(e)1** allows for prescriptive trade-off based on **Table 140.4-F**. The minimum efficiencies in **§ 110.2** must be met. If the unit is rated with a part-load metric, only the minimum cooling efficiency of the unit is used to meet the exception.

Nonresidential HVAC Alterations

Is an economizer required for replacement of HVAC single packaged units per § 141.0(b)2C of the 2022 Energy Code?

Yes. Exception 4 to **§ 141.0(b)2C** requires single packaged air-cooled commercial unitary air conditioners or heat pumps with cooling capacity less than 54,000 Btu per hour to meet the economizer requirements in **§ 140.4(e)**. This exception does not require economizers for replacements of VRF, split systems, or systems that are not single packaged units.

FOR MORE INFORMATION

Online Resource Center (ORC): www.energy.ca.gov/orc

Home Energy Rating System (HERS): www.energy.ca.gov/HERS

Acceptance Test Technician Certification Provider Program (ATTCP): www.energy.ca.gov/ATTCP

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CALIFORNIA ENERGY COMMISSION

CEC-400-2023-007

Issue 141 | January - March 2023

BLUEPRINT

CALIFORNIA ENERGY COMMISSION

EFFICIENCY DIVISION

In This Issue

The CEC welcomes feedback on Blueprint. Please contact the editor at **Title24@energy.ca.gov**

CalAPP Program Grants

The California Automated Permit Processing (CalAPP) program application deadline is May 1, 2023. Applying reserves the grant funds for California cities and counties to establish online solar permitting, such as SolarAPP+. The jurisdiction has until 2027 to complete the grant activities and receive reimbursement. As of March 1, 2023, more than $6 million in grant awards are approved for 110 jurisdictions.

If the jurisdiction has already adopted an online solar permitting platform, there still may be opportunities to receive funding. Some acceptable grant activities include:

- Training events for staff and local installers.
- Maintenance costs, which can include adding support for permitting of energy storage paired with solar energy systems.
- Up to three years of subscription costs for the software database that supports the newly adopted platform.

Please review the solicitation manual and terms and conditions before completing an application. Visit the **CalAPP program webpage** for program documents, common questions, and the application form.

SARA Calculations for PV

The California Energy Commission (CEC) has posted a regulatory advisory to clarify requirements in the 2022 Building Energy Efficiency Standards (Energy Code) for the solar access roof area (SARA) calculations. When there is another part of the California Building Code that requires roof area to be left clear, those areas do not need to be included in SARA. See the **SARA regulatory advisory** for more information.

Battery Sizing Examples

The 2022 Energy Code **§ 140.10** and **§ 170.2(g-h)** have prescriptive requirements for solar photovoltaic (PV) and battery storage systems for newly constructed nonresidential and high-rise multifamily buildings, respectively. The minimum

PV capacity (W/ft² of conditioned floor area) is determined using **Equation 140.10-A** or **Equation 170.2-D** for each building type shown in **Table 140.10-A** or **Table 170.2-U**. The battery sizing is determined based on the PV capacity calculated for each building type.

However, when the PV capacity is determined by multiplying the solar access roof area (SARA) by 14 watts per square foot, it yields the required PV capacity for the whole building. To determine the battery storage requirements, the whole building PV capacity needs to be allocated to each building type shown in **Table 140.10-B** or **Table 170.2-V**. The CEC recommends using the percentage allocations that occur when the PV capacity is determined using the PV equation as shown in Figure 1. The CEC recommends using the SARA-based PV capacity percentage allocations to determine the battery capacity requirements for each building type as shown in Figure 2.

The example in Figure 1 and Figure 2 uses a hypothetical total PV capacity per the equation of 699.64 kWdc and SARA-based PV capacity of 296.42 kWdc for a mixed-use, newly constructed building.

Figure 1: Example of Allocations for SARA-Based PV Capacity

Building Type	PV per Equation (kWdc)	Percentage of PV (%)	PV share with SARA (kWdc)
High-rise multifamily	643.95	92.04	272.82
Retail	43.17	6.17	18.29
Office	12.52	1.79	5.31
Total	699.64 kWdc	100%	296.42 kWdc

Figure 2: Example of Allocations for SARA-Based Battery Capacity

Building Type	Percentage of PV (%)	PV share with SARA (kWdc)	Energy Capacity (kWh)	Power Capacity (kWdc)
High-rise multifamily	92.04	272.82	288.30	70.93
Retail	6.17	18.29	19.33	4.76
Office	1.79	5.31	9.15	2.23
Total	100%	296.42 kWdc	316.78 kWh	77.92 kWdc

For additional help with the Energy Code, see Energy Code Ace's **online offerings** of trainings, tools, and resources.

Demand Response Controls

The Energy Code has certification requirements for demand-responsive controls in **§ 110.12(a)**.

For demand-responsive controls that comply according to **§ 110.12(a)1A**, the certified OpenADR 2.0 Virtual End Node (VEN) can be incorporated into a networked system of devices allowing the VEN to communicate with multiple devices in the network. Alternatively, each demand-responsive control device in the building could be a certified VEN. Devices downstream of the certified OpenADR 2.0 VEN do not need to be certified to **§ 110.12(a)1**. The OpenADR 2.0 VEN must be installed on-site as part of the demand-responsive control system and at time of inspection.

For demand-responsive controls that comply according to **§ 110.12(a)1B**, the demand-responsive control system must be certified to the CEC as being capable of automatically responding to a certified OpenADR 2.0b VEN. The VEN may be separately located on-site, off-site, or in the cloud, and is not required to be in operation at the time of permitting. The demand-responsive control

must be programmed or configured so any test control strategy defined in the building code can be deployed at the time of permitting.

The 2022 Energy Code **§ 110.12(a)2** requires that all demand-responsive controls must be capable of communicating with the VEN using a wired or wireless bidirectional communication pathway. The communication pathway to the VEN must be installed or established to comply. See the **2022 Nonresidential and Multifamily Compliance Manual Appendix D, Section 1** for more information.

To verify demand-responsive controls are certified to the CEC, visit the **demand responsive lighting control webpage** or the **occupant controlled smart thermostats webpage**.

ENERGY STANDARDS HOTLINE

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  - EnergyPro 9.1
- For nonresidential and multifamily buildings
  - CBECC 2022.2.1
  - EnergyPro 9.1

All permit applications submitted on or after January 1, 2023, need to comply using software and forms approved for the 2022 Energy Code. The previous software versions CBECC 2022.1.0 and CBECC-Res 2022.1.0 are expired. Please visit the **compliance software webpage** for the latest versions of the software and software expiration dates.

Q&A

Solar Ready

Does a newly constructed accessory dwelling unit (ADU) need to comply with the solar ready mandatory requirements in § 110.10 if the project is not required to install PV?

No. Per **§ 110.10(a)1** solar ready applies to new single-family homes located in subdivisions of ten or more. Therefore, solar ready is not applicable to a newly constructed ADU on an existing lot.

Single-Family Energy Storage Ready

Could a 200 amp panel meet the mandatory energy storage system (ESS) ready requirements in the 2022 Energy Code § 150.0(s)1B?

Yes. A 200 amp panel could meet the requirement if the busbar rating is 225 amps and it is clearly marked on the panel. However, if there is no specific busbar rating on the panel, the 200 amp panel will not meet the requirement, since the busbar rating will be the same as the panel rating. Panels must also meet applicable requirements in the California Electrical Code.

Does an ADU need to have its own 225 amp panel if the ADU is built with a subpanel connected to the existing main residence?

No. The subpanel to the ADU from the main panel could meet **§ 150.0(s)1B**, as long as the main panel has the 225 amp busbar rating.

Does installing a battery storage system in a newly constructed single-family home meet the mandatory ESS ready requirements in § 150.0(s)?

Yes. If the newly built home's energy storage system meets all the necessary wiring and other electrical components required to support a fully operating energy storage system, this will satisfy the mandatory requirements in **§ 150.0(s)**.

Nonresidential Dehumidifiers

Does a commercial dehumidifier need to meet federal standards to comply with the 2022 Energy Code dehumidification requirements in § 120.6(h)1A?

Yes. A commercial dehumidifier is subjected to federal regulations. The unit must meet all minimum requirements of 10CFR430.32(v)2 when tested with 10CFR430.32(z) and 10CFR430 (Subpart B) Appendix X or X1 as specified by the product description per **§ 120.6(h)1A**.

Is there a list to verify compliance for commercial dehumidifiers?

No. Commercial dehumidifiers do not need to be listed in the U.S. Department of Energy compliance certification database. Additionally, the CEC does not maintain a list for commercial dehumidifiers, and there are currently no California regulations requiring the certification of these units to the Title 20 appliance database (MAEDbS).

Nonresidential and Multifamily Roof Alterations

Is a full roof recoat exempt from the 2022 Energy Code insulation requirements in § 141.0(b)2Bii and § 180.2(b)1Aiii?

Yes. If a roof has an existing coating, the application of a top coating for renewal or maintenance (roof recoat) is exempt from the low-sloped roof insulation requirements of **§ 141.0(b)2Bii** and **§ 180.2(b)1Aiii**. However, when a roof recoat layer is part of a roof recover as defined in **§ 100.1**, it is required to meet the insulation requirements of **§ 141.0(b)2Bii** and **§ 180.2(b)1Aiii**.

FOR MORE INFORMATION

Online Resource Center (ORC): www.energy.ca.gov/orc

Home Energy Rating System (HERS): www.energy.ca.gov/HERS

Acceptance Test Technician Certification Provider Program (ATTCP): www.energy.ca.gov/ATTCP

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CALIFORNIA ENERGY COMMISSION

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BLUEPRINT

CALIFORNIA ENERGY COMMISSION

EFFICIENCY DIVISION

In This Issue

2019 Energy Code: SEER2 Guidance

The U.S. Department of Energy's (DOE) published **final rule of increased efficiency standards** for residential air conditioners and heat pumps takes effect on January 1, 2023. The updated **DOE test procedure (PDF)** is used to determine new product efficiency ratings and is intended to be more representative of installations in homes. The current ratings will no longer be used for seasonal energy efficiency ratio (SEER), energy efficiency ratio (EER), and heating seasonal performance factor (HSPF). These efficiencies will be replaced by new SEER2, EER2, and HSPF2 ratings. This new system of measurement will apply to all single-phase air conditioners and heat pumps less than 65,000 Btu per hour.

Central air conditioners that are installed on or after January 1, 2023, must comply with the new DOE regional standards. The new standards apply to heat pump equipment manufactured on or after January 1, 2023. HVAC manufactures have been preparing for these changes and have products using the SEER2, EER2, and HSPF2 ratings.

To address projects permitted under the 2019 Building Energy Efficiency Standards (Energy Code), when the equipment has a SEER rating, but the equipment installed must use the new SEER2 rating, use the conversion in Table 1. The conversions provided in Table 1 are only to be used for the purpose of documenting compliance with the 2019 Energy Code. Equipment must be verified as compliant with the federal standards based on the actual ratings for SEER2.

For example, in a scenario where SEER rated equipment is specified in the project design on the 2019 residential certificate of compliance (CF1R) and equipment with only a SEER2 rating is installed and reported on the certificate of installation (CF2R), Table 1 may be used to convert the manufacturer's SEER2 rating value to a SEER rating value to determine if the installed equipment complies.

System Type	Equation
Split system air conditioner < 45,000 Btu/h	SEER = SEER2 X 1.049
	EER = EER2 X 1.043
Split system air conditioner ≥ 45,000 Btu/h	SEER = SEER2 X 1.051
	EER = EER2 X 1.045
Split system heat pump	SEER = SEER2 X 1.049
	HSPF = HSPF2 X 1.173
Packaged air conditioner and heat pump	SEER = SEER2 X 1.045
	EER = EER2 X 1.038
	HSPF = HSPF2 X 1.176
Space constrained air conditioner	SEER = SEER2 X 1.026
Space constrained heat pump	SEER = SEER2 X 1.008
	HSPF = HSPF2 X 1.175
Small duct high velocity system	SEER = SEER2 X 1.000
	HSPF = HSPF2 X 1.180

Table 1: Equations to Convert Respective Ratings for the 2019 Energy Code
Source: California Energy Commission

The installer should perform the conversion when completing the CF2R. The actual SEER2 rating value must be included in the form notes as "SEER2 rating = XX.X" and the converted SEER rating value must be entered in the efficiency value field. The building official should confirm that the SEER2 rating of the equipment installed on site matches the SEER2 rating value included in the form notes and that the SEER rating value is converted accurately using Table 1. The same method can be used to demonstrate compliance for the EER2 and HSPF2 ratings.

All projects submitted under the 2022 Energy Code will use the new ratings for SEER2, EER2, and HSPF2. The 2022 Energy Code standard design uses the new DOE standard minimum efficiencies.

2022 Energy Code: Compliance Software

Approved updated versions of the 2022 Energy Code compliance software are available on the **2022 Energy Code compliance software webpage**.

- For single-family buildings
  - CBECC-Res 2022.2.0
- For nonresidential and multifamily buildings
  - CBECC 2022.2.0

All permit applications submitted on or after January 1, 2023, will need to comply using software and forms approved for the 2022 Energy Code. The previous software versions CBECC 2022.1.0 and CBECC-Res 2022.1.0 will expire. Please visit the **compliance software webpage** for the latest versions of the software and software expiration dates.

2022 Energy Code: Compliance Documents

Certificate of compliance documents (forms) that can be used to demonstrate performance compliance with the 2022 Energy Code are available through the approved software programs. Document registration with an approved residential data registry is required by the 2022 Energy Code **§ 10-103(a)** for newly constructed buildings and additions or alterations to existing buildings.

Single-Family Residential Compliance Forms

Prescriptive CF1R and CF2R fillable forms for non-HERS additions and alterations are available on the **2022 Energy Code webpage**. Prescriptive CF1R, CF2R, and CF3R forms for all projects with HERS measures need to be completed through the Home Energy Rating System (HERS) providers registry.

Registration of the 2022 Energy Code single-family residential and nonresidential compliance documents are expected to be available January 1, 2023, through approved data registries.

Low-Rise Multifamily Compliance Forms

Prescriptive LMCC, LMCI, and LMCV fillable forms for low-rise multifamily buildings are available on the **2022 Energy Code webpage** until the forms can be registered with an approved residential data registry.

The LMCC, LMCI, LMCV will have a **delayed availability (PDF)** to be registered through the approved HERS data registries pending development by CalCERTS and CHEERS. It is expected that the low-rise multifamily data registries will be available in spring of 2023.

Enforcement agencies should:

- Accept, review, and approve plans and unregistered LMCCs until an approved residential data registry capable of processing these forms becomes available.
- Ensure that the multifamily compliance software used is approved by the CEC for demonstrating compliance with the 2022 Energy Code.
- Retain digital or paper copies of the documents submitted for eventual registration.
- Confirm that LMCCs are registered before a permit is final or a certificate of occupancy is issued.

Nonresidential Compliance Forms

Prescriptive NRCC, NRCI, and NRCA fillable forms are available through the **2022 Energy Code webpage**. NRCA fillable forms ending in F must be completed by a field technician. NRCA forms ending in A will need to be completed by a Certified Acceptance Test Technician (ATT) through the certification provider's website. NRCV forms must be completed through the HERS providers registry.

For more info visit the **HERS webpage** and the **ATTCP webpage**.

Compliance Document Signatures

The documentation author and responsible person must sign the residential certificates of compliance (CF1R/LMCC), installation (CF2R/LMCI), and verification (CF3R/LMCV) per § 10-103 of the 2022 Energy Code. Each compliance form has two signature blocks. The first is the declaration statement for the documentation author, and the second block is for the responsible person.

The documentation author is the person that completes the form by performing a service under the authority of the person with overall project responsibility. Their signature certifies that the information entered on the form is accurate and complete. There are no licensing or training requirements for a documentation author. After the documentation author signs the form, it must be reviewed and signed by the responsible person.

The responsible person is the person who accepts responsibility for complying with the Energy Code. The responsible person for each compliance form is as follows:

- CF1R/LMCC: The responsible person accepts responsibility for the building design, such as a primary installing contractor, building owner or builder, a certified energy analyst, architect, or engineer.
- CF2R/LMCI: The responsible person accepts responsibility for the construction or installation of features, materials, components, or manufactured devices regulated by the Energy Code such as the general contractor or primary installer. Only installation forms have the option for a delegated signature authority.
- CF3R/LMCV: The responsible person is the HERS Rater who accepts responsibility for performing field verification and diagnostic testing. Only HERS Raters may be responsible for verification.

HERS Raters are not intended to sign as a project's responsible person on the CF1R/LMCC. While the Business and Professions Code does not prevent HERS Raters from accepting this responsibility, there is the risk of a conflict of interest as defined by the HERS regulations.

HERS Raters must remain independent entities from the builder and subcontractors who install energy efficient features, per Title 20 § 1673(j)(2). HERS Raters can charge for testing features and completing forms to sustain their business.

HERS Raters may sign the CF2R/LMCI as the responsible person using installer-delegated signature authority. HERS Raters may complete and sign most forms as the document author.

Nonresidential Acceptance Testing

The CEC has approved the 2022 Energy Code application updates of these **Acceptance Test Technician Certification Providers (ATTCP)** to train, certify, and recertify acceptance test technicians (ATT) and their employers:

- California Advanced Lighting Controls Training Program (CALCTP)
- National Lighting Contractors Association of America (NLCAA)
- California State Pipe Trades Council (CSPTC)
- National Environmental Balancing Bureau (NEBB)
- National Environmental Management Institution Committee (NEMIC)
- Refrigeration Service Engineers Society (RSES)

Mechanical acceptance testing must be completed by an approved mechanical ATT for nonresidential projects with permits applications submitted on or after October 1, 2021. Free training for inspectors and building officials is available through approved ATTCPs.

For additional help with the Energy Code, see Energy Code Ace's **online offerings** of trainings, tools, and resources.

2022 Energy Code: New Resources on the ORC

New resources for the 2022 Energy Code are available on the **Online Resource Center water heating webpage**.

- 2022 Water Heater Efficiency Guide
- 2022 Single-Family Residential Water Heater Alterations

Q&A

Air Conditioning System Changeouts

Do replacement HVACs need to meet the new DOE minimum efficiency requirements for projects changing out the air conditioning unit in an existing home?

Yes. The DOE has set regional minimum SEER2 and EER2 requirements that are effective based on the date a unit is installed. These requirements are applicable to split system and single package central air conditioners installed on or after January 1, 2023. Projects installing one of these types of units on or after this date must meet both the minimum SEER2 and EER2 requirements.

Can a heat pump without a SEER2 rating be installed as a replacement HVAC?

Yes. If the heat pump was manufactured before January 1, 2023, and meets the required efficiencies, it may be installed. The new DOE's SEER2 and HSPF2 standards apply to heat pump units manufactured on or after January 1, 2023. The DOE's date of installation requirement is only applicable to split system air conditioners. All heat pump equipment minimum efficiency requirements are based on the date of manufacture, not date of installation.

Vented Range Hood Alterations

Does an alteration or replacement of a vented range hood require HERS verification under the 2022 Energy Code?

No. Per the 2022 Energy Code § **150.2(b)1Miib**, alterations or replacements of a vented range hood alone (using existing ducts) does not require HERS verification. However, per the 2022 Energy Code **§ 150.2(b)1L** an entirely new vented range hood and new or complete replacement ducts must meet the mandatory requirements in § **150.0(o)**, which will include HERS verification.

The CEC welcomes feedback on Blueprint. Please contact the editor at **Title24@energy.ca.gov**

PV for Nonresidential Tenant Improvements

Do the nonresidential PV and battery storage requirements in the 2022 Energy Code apply to a new tenant improvement (first time build-out) in a multi-tenant building?

Yes. First time tenant improvements (TI) for individual spaces where the building space has never been used or occupied for any purpose meets the definition of a newly constructed building per the Energy Code **§ 100.1**. The 2022 Energy Code requirements apply to permit applications for first time TIs for each space in a building that are submitted on or after January 1, 2023. All newly constructed building types specified in **Table 140.10-A** must meet the applicable PV and energy storage system requirements of **§ 140.10** of the 2022 Energy Code. Some exceptions may apply. The building space occupancy status is determined by the local enforcement agency.

Do the nonresidential PV and battery storage requirements in the 2022 Energy Code apply to unleased tenant spaces in a newly constructed multi-tenant building?

Yes. Unleased tenant spaces in newly constructed multi-tenant buildings must comply with the PV and battery storage requirements per the capacity factors in **Table 140.10-A** and **Table 140.10-B**. A mixed occupancy building where at least 80 percent of the floor area is one or more of the specified types must comply. If the building includes more than one of the space types listed in **Table 140.10-A**, the total PV system required is the combined capacities determined for each type. Some exceptions may apply.

Do the nonresidential PV and battery storage requirements in the 2022 Energy Code apply to a tenant improvement in a tenant space that was previously occupied?

No. A tenant improvement in an existing building tenant space that was previously occupied would be considered an alteration. Alterations need to comply with the applicable requirements in **§ 141.0(b)** depending on the scope of work. An alteration is any change to a component that is regulated by the Energy Code, including water-heating system, ventilation system, space-conditioning system, indoor, outdoor, and sign lighting, electrical power distribution system, envelope, and any covered process. For alterations that change the occupancy classification of the tenant space, the requirements per § 141.0 apply to the new occupancy type.

Unconditioned Space in PV Calculations

Is unconditioned space in a nonresidential building included in the PV calculation when 80 percent or more of the entire building floor area, both conditioned and unconditioned, is a building space type listed in Table 140.10-A of the 2022 Energy Code?

No. Unconditioned floor area is considered part of the 80 percent trigger for spaces listed in **Table 140.10-A** for the nonresidential PV requirements. However, only the conditioned floor area of the spaces listed in **Table 140.10-A** are considered when calculating the required PV system size per **Equation 140.10-A**. SARA must also be calculated and multiplied by 14 Watts per square foot. The smaller of the two calculations determines the PV system size, or required PV as calculated using approved software in the performance approach. Some exceptions may apply.

Multifamily Ceiling Insulation Alterations

Does altering a ceiling trigger the new insulation requirements in the 2022 Energy Code?

Yes. The attic insulation and air sealing prescriptive requirements per **§ 180.2(b)1Bi** apply to vented attics in most climate zones when the ceiling above a conditioned space is altered. A ceiling may be considered altered under various conditions including when the existing attic insulation is replaced, new attic insulation is added, or the ceiling plane is replaced.

Does adding or replacing HVAC in a vented attic trigger the new insulation requirements?

Yes. The attic insulation and air sealing prescriptive requirements per **§ 180.2(b)1Bi** apply when an entirely new or complete replacement duct system is installed in a vented attic per **§ 180.2(b)2Aiial**.

Are there exceptions to the ceiling insulation and air sealing requirements in § 180.2(b)1Bi?

Yes. There are several exceptions depending on the climate zone and existing conditions in the attic.

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CALL
800-772-3300 Toll free in CA
916-654-5106 Outside CA

HOURS 8 a.m.–12 p.m. and 1 p.m.–4:30 p.m.

FOR MORE INFORMATION

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Home Energy Rating System (HERS): www.energy.ca.gov/HERS

Acceptance Test Technician Certification Provider Program (ATTCP): www.energy.ca.gov/ATTCP

2019 Approved Compliance Software: https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2019-building-energy-efficiency-2

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Blueprint newsletter serves as a resource to assist stakeholders in complying with the Energy Code. It does not provide legal advice. Please refer to California Code of Regulations, Title 24, Parts 1 and 6 for specific requirements.

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BLUEPRINT

CALIFORNIA ENERGY COMMISSION
EFFICIENCY DIVISION

IN THIS ISSUE

2022 Energy Code: Single-Family Summary

The most significant change in the 2022 Building Energy Efficiency Standards (Energy Code) affecting single-family residential buildings is a prescriptive heat pump baseline for either water heating or space heating, depending on the climate zone. The ventilation requirements are strengthened to improve indoor air quality. There are new requirements and revisions for additions and alterations. The definition for single-family buildings in § 100.1 is updated. These and other significant changes include:

Mandatory Requirements

- Adds roof deck insulation with maximum area-weighted average U-factor of U-0.184 in climate zones 4 and 8-16. § 150.0(a)1
- Simplifies hot water piping language and defers to California Plumbing Code. § 150.0(j)
- Simplifies and reorganizes language for lighting requirements. § 150.0(k)
- Clarifies ducts in conditioned space do not require insulation when specific criteria are met, and ducts are located entirely inside the thermal envelope of the building. § 150.0(m)1B
- Adds filter racks or grilles shall be gasketed or sealed to prevent air from bypassing the filter. § 150.0(m)12Bv
- Updates gas water heater installations need to designate a space for a future heat pump water heater (HPWH). § 150.0(n)
- Adds requirements for central fan integrated (CFI) ventilation systems, specifying controlled, motorized outdoor air dampers. § 150.0(o)1B
- Updates vented kitchen range hood ventilation rates or capture efficiencies based on conditioned floor area and fuel type per Tables 150.0-E, F, G. § 150.0(o)1G

- Adds installed heat recovery ventilation (HRV) and energy recovery ventilation (ERV) systems must have a Home Energy Rating System (HERS) verified maximum fan efficacy of 1.0 watts per cfm. § 150.0(o)2C
- Adds energy storage system (ESS) ready requirements, including interconnection equipment or a dedicated raceway, a minimum of four branch circuits, a minimum busbar rating of 225 amps, and space for future installation of system isolation equipment or a transfer switch. Figures 1-2. § 150.0(s)
- Adds electric ready requirements for space heating, cooktops, and clothes dryers when gas equipment is installed. Electrical infrastructure must be provided and reserved to the equipment location for the future installation of electrical appliances. § 150.0(t)-(v)

Performance Compliance

- Updates energy design rating (EDR) metric. EDR1 is based on hourly source energy. The efficiency EDR and photovoltaic (PV)/flexibility EDR, based on the time dependent valuation (TDV) energy, are now under EDR2. Compliance requires separately meeting EDR1, efficiency EDR2, and total EDR2. § 150.1(b)1

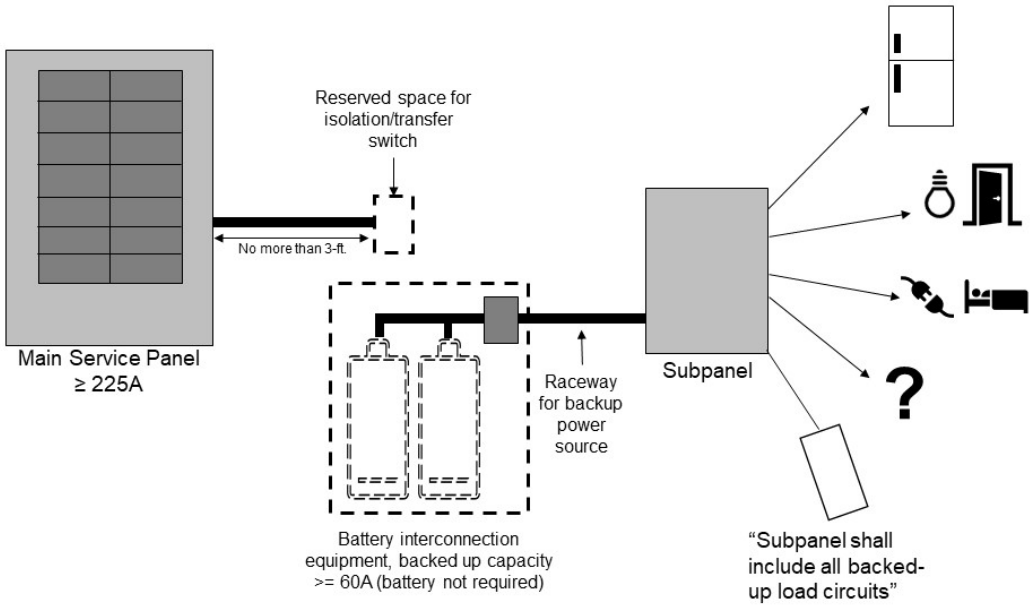

Figure 1: Energy Storage System Ready Configuration per § 150.0(s)1A

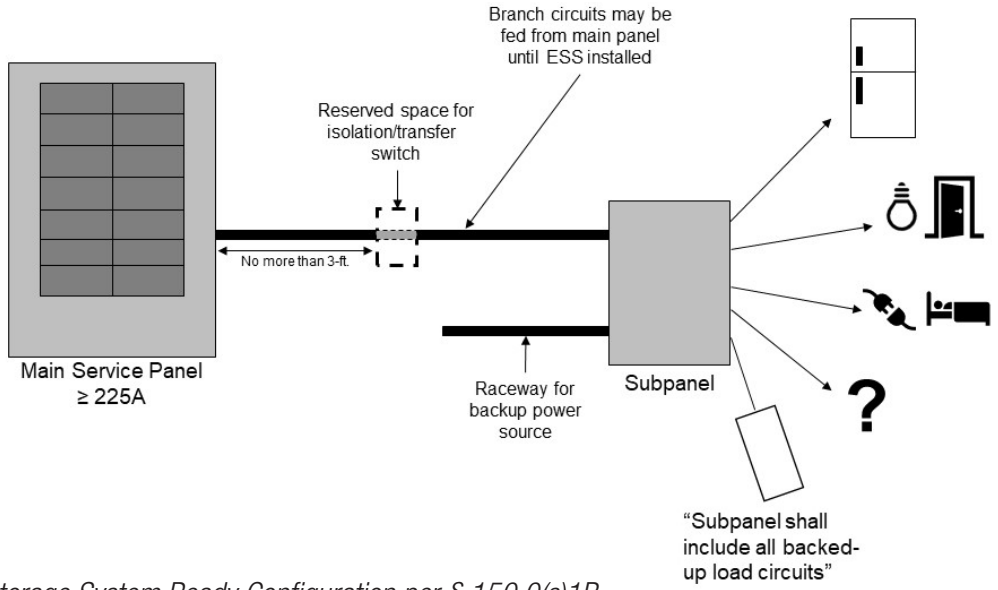

Figure 2: Energy Storage System Ready Configuration per § 150.0(s)1B

Prescriptive Compliance

- Adds requirement for heat pump space heating equipment in climate zones 3, 4, 13, and 14. In other climate zones, either a heat pump or a gas heating system may be used. § 150.1(c)6
- Adds water heating equipment must be a HPWH meeting certain criteria or a solar water-heating system with electric backup. § 150.1(c)8
- Adds exception for climate zones 3, 4, 13, and 14 to allow a gas instantaneous water heater (maximum input 200,000 Btu per hour, no storage tank) when the space-conditioning system is a heat pump. § 150.1(c)8
- Adds exception for new dwelling units with a conditioned floor area of 500 square feet or less to allow an instantaneous electric water heater with point of use distribution. § 150.1(c)8
- Adds exception to whole-house fans for new dwelling units with a conditioned floor area of 500 square feet or less. § 150.1(c)12
- Clarifies PV language; adds solar access roof area (SARA) definition and method of calculation. § 150.1(c)14
- Adds exception that no PV system is required when size is less than 1.8 kWdc per the available SARA or using Equation 150.1-C. § 150.1(c)14

Additions and Alterations

- For additions:
  - Updates duct leakage testing applicable when extending any length of existing ducting. § 150.2(a)
  - Adds new or replacement space heating equipment serving an addition may be a heat pump or gas heating system. § 150.2(a)
  - Updates roof and ceiling insulation in a vented attic for additions less than 700 square feet: in climate zones 1, 2, 4, and 8-16 maximum overall assembly U-factor of 0.025 (R-38 in a wood-frame), in climate zones 3 and 5-7 maximum overall assembly U-factor of 0.031 (R-30 in a wood-frame). § 150.2(a)1Bi
  - Adds exception from the whole-dwelling unit mechanical ventilation for additions of junior accessory dwelling units (JADU) that are 500 square feet or less, contained entirely within an existing single-family building. § 150.2(a)1Cia2
  - Updates water heater options for more specificity across all types. § 150.2(a)1D
- For alterations:
  - Updates duct leakage testing trigger when more than 25 feet of ducts are replaced or installed. § 150.2(b)1D
  - Expands HPWH requirements to all climate zones. § 150.2(b)1Hiii
  - Updates exception allowing a consumer electric water heater to replace an existing electric resistance water heater. § 150.2(b)1Hiii
  - Expands roof replacement efficiencies to additional climate zones. § 150.2(b)1I
  - Adds roof deck insulation for low-sloped roofs, including exceptions. § 150.2(b)1Iiib
  - Adds ceiling insulation for vented attics. § 150.2(b)1J
  - Revises indoor air quality and mechanical exhaust requirements to clarify applicability for alterations. § 150.2(b)1L-M
  - Adds requirement for alterations that increase exterior door area to meet U-factor. § 150.2(b)1N

View and download the 2022 Energy Code documents on the **2022 Energy Code webpage**.

The CEC welcomes feedback on Blueprint.
Please contact the editor at **Title24@energy.ca.gov**

2022 Energy Code: New Summaries on the ORC

New resources for the 2022 Energy Code are available on the **Online Resource Center overview webpage**.

- Single-Family Mandatory Requirements Summary
- Single-Family What's New Summary
- Multifamily What's New Summary
- Nonresidential What's New Summary

Q&A

ESS Ready for ADUs

Does a newly constructed accessory dwelling unit (ADU) need to comply with the ESS ready requirements in § 150.0(s) of the 2022 Energy Code?

Yes. A newly constructed residential building that includes a dwelling unit of any size must meet the energy storage system ready requirements per § 150.0(s). The ADU must also meet the electric ready requirements in § 150.0(t)-(v) when installing gas appliances.

Do other types of newly constructed buildings on a residential site need to meet the ESS ready requirements?

No. If the new residential building does not include a dwelling unit, such as a pool house, art studio, office, etc., it will not need to meet the ESS ready requirements.

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916-654-5106 Outside CA

HOURS 8 a.m.–12 p.m. and 1 p.m.–4:30 p.m.

Single-Family Water Heating Alterations

Is a HPWH allowed when replacing a water heater under the 2022 Energy Code?

Yes. The 2022 Energy Code § 150.2(b)1Hiii allows HPWHs in all climate zones. A demand responsive HPWH with the storage tank not located outdoors, on rigid R-10 insulated surface will comply, or a HPWH that meets NEEA Tier 3 or higher.

Will a gas water heater replacement comply prescriptively with the 2022 Energy Code?

Yes. Natural gas or propane water heaters are allowed for water heater replacements in the 2022 Energy Code per § 150.2(b)1Hiiia.

Does an electric resistance water heater comply prescriptively with the 2022 Energy Code?

Yes. When replacing an existing electric resistance water heater, a new consumer electric water heater is allowed per § 150.2(b)1Hiiid. However, HPWHs are the more efficient option for an electric water heater replacement.

Single-Family Water Heating for ADUs

Does an all-electric ADU that is an addition have any alternatives when there is not enough space for a HPWH?

Yes. In the 2022 Energy Code § 150.2(a)1Div, if the ADU addition is no larger than 500 square feet, an electric tankless water heater may be used prescriptively, with point of use distribution per RA4.4.5.

If an all-electric ADU is newly constructed, are there alternatives when there is not enough space for a 240V HPWH?

Yes. In the 2022 Energy Code an exception to § 150.1(c)8 allows a newly built dwelling unit with 500 square feet or less to install an instantaneous electric water heater with point of use distribution per RA4.4.5. An exception to § 150.1(c)8A and B allows a new dwelling unit with one bedroom or less to install a 120V HPWH in place of a 240V HPWH.

Single-Family Ceiling Insulation Alterations

Does altering a ceiling trigger the new insulation requirements in the 2022 Energy Code?

Yes. The attic insulation and air sealing prescriptive requirements per § 150.2(b)1J apply to vented attics in most climate zones when the ceiling above a conditioned space is altered. A ceiling may be considered altered under various conditions including when the existing attic insulation is replaced, new attic insulation is added, or the ceiling plane is replaced.

For additional help with the Energy Code, see Energy Code Ace's **online offerings** of trainings, tools, and resources.

Does adding or replacing HVAC in a vented attic trigger the new insulation requirements?

Yes. The attic insulation and air sealing prescriptive requirements per § 150.2(b)1J apply when an entirely new or complete replacement duct system is installed in a vented attic per § 150.2(b)1Dii.

Are there exceptions to the ceiling insulation and air sealing requirements in § 150.2(b)1J?

Yes. There are several exceptions depending on the climate zone and existing conditions in the attic.

Single-Family Lighting

Will lighting sources labeled JA8-2016 and JA8-2019 be allowed for 2022 Energy Code compliance?

Yes. The stringency of the performance requirements for JA8 certification remains consistent. All three labels, JA8-2016, JA8-2019, and JA8-2022, indicate that the minimum performance standards meet or exceed the 2022 Energy Code. This also includes the labels for elevated temperatures.

FOR MORE INFORMATION

Online Resource Center (ORC): www.energy.ca.gov/orc

Home Energy Rating System (HERS): www.energy.ca.gov/HERS

Acceptance Test Technician Certification Provider Program (ATTCP): www.energy.ca.gov/ATTCP

2019 Approved Compliance Software: https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2019-building-energy-efficiency-2

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EFFICIENCY DIVISION

IN THIS ISSUE

For additional help with the Energy Code see Energy Code Ace's **online offerings** of trainings, tools, and resources.

2022 Energy Code: Multifamily Summary

The 2022 Building Energy Efficiency Standards (Energy Code) reorganizes low-rise (three or fewer habitable stories) and high-rise (four or more habitable stories) multifamily buildings into one building type, updates the multifamily buildings definition in § 100.1, and moves all requirements for multifamily buildings to §§ 160.0-180.4. This and other significant changes include:

Mandatory Requirements

- Updates minimum efficiencies for HVAC equipment; adds minimum efficiency requirements for dedicated outdoor air systems (DOAS), heat pump, and heat recovery chiller packages. § 110.2
- Changes demand responsive lighting controls trigger to 4,000 watts or more; adds requirements for controlled receptacles. §§ 110.12, 160.5(b)4E
- Unifies envelope insulation, vapor retarder, and fenestration requirements. § 160.1
- For dwelling units
  - Adds requirements for central fan integrated ventilation systems requiring a motorized controlled damper, damper controls, and variable ventilation. § 160.2(b)2Aii
  - Requires vented kitchen range hoods ventilation rates or capture efficiencies based on conditioned floor area and fuel type per Tables 160.2-E, F, G. § 160.2(b)2Avic2
  - Requires a HERS-verified maximum fan efficacy of 1.0 Watts per cfm for heat recovery ventilation (HRV) and energy recovery ventilation (ERV) systems. § 160.2(b)2Biii
  - Adds mechanical acceptance testing requirements. § 160.3(d)2
  - Adds electric-ready requirements when gas equipment is installed for space heating, cooking, and clothes dryers. § 160.9(a-c)

- For common areas
  - Requires mandatory duct leakage testing. § 160.3(c)2H
  - Adds electric-ready requirements when gas clothes dryers are installed. § 160.9(c)2
- Adds air sealing for filter racks or grilles to prevent air from bypassing the filter. §§ 160.2(b)1Bv, 160.2(c)1D
- Requires mechanical ventilation systems of enclosed parking garages to meet § 120.6(c). § 160.2(d)
- Requires water heating pipe insulation per Table 160.4-A. § 160.4(f)
- Unifies lighting requirements; clarifies applicability for dwellings, common areas, and outdoor areas. § 160.5
- Clarifies requirements for communal or single-tenant pool and spa systems. § 160.7(b)

Prescriptive Compliance

- Clarifies vertical fenestration and glazed door area is based on conditioned floor area and gross wall area; updates fenestration efficiency values per type, climate zone, and number of habitable stories. § 170.2(a)
- For dwelling units:
  - Establishes heat pump space heating baselines for most climate zones. § 170.2(c)3A
  - Requires ERV or HRV in some climate zones when balanced ventilation is used for indoor air quality. § 170.2(c)3Biv

Figure 1: Multifamily dwelling units with PV

- For common areas:
  - Revises fan power requirements, including 1kW fan electrical input power trigger, adds new allowances for system type, air flow, filtration, etc. § 170.2(c)4
  - Adds requirements for DOAS and exhaust air heat recovery. § 170.2(c)4N-O
- Unifies water heater requirements; clarifies water heaters serving single dwelling units may be a heat pump water heater (HPWH) or gas instantaneous water heater; adds plumbing and configuration requirements for central HPWHs; requires gas/propane central water heater systems to meet minimum equipment thermal efficiency, recirculation, and solar water heating criteria. § 170.2(d)
- Unifies indoor common area lighting and outdoor lighting requirements; updates indoor luminaire power densities (LPDs), outdoor hardscape and additional lighting power allowances. § 170.2(e)
- Updates photovoltaic (PV) for three habitable stories or less; adds PV and battery storage for multifamily of four or more habitable stories. § 170.2(f-h)

Additions and Alterations

- For additions:
  - Unifies envelope, indoor air quality (IAQ), and water heater requirements, including exceptions. § 180.1(a)
  - Clarifies new water heaters installed to serve dwelling units must meet prescriptive requirements in § 170.2(d). § 180.1(a)3

- For alterations:
  - Unifies envelope, HVAC, water heating, lighting, electrical power distribution, and IAQ requirements. § 180.2(b)
  - Adds insulation, air sealing, and recessed luminaire requirements for vented attics. § 180.2(b)1Bi
  - Updates fenestration efficiency per type, climate zone, and number of habitable stories. § 180.2(b)1C
  - Adds fan power requirements for HVAC in common areas. § 180.2(b)2Bi
  - Clarifies individual dwelling units may use HPWH or gas/propane water heater. § 180.2(b)3C
  - Clarifies applicability of IAQ and mechanical exhaust requirements. § 180.2(b)5

The significant changes for single-family residential summary will be highlighted in a future Blueprint. Download final documents on the **2022 Energy Code webpage**.

2022 Energy Code: Compliance Software

The 2022 Energy Code compliance software and forms were approved and are available on the **2022 Energy Code webpage**.

For single-family buildings:

- CBECC-Res 2022.1.0

For nonresidential and multifamily buildings:

- CBECC 2022.1.0

All permit applications submitted on or after January 1, 2023, will need to comply using software and forms approved for the 2022 Energy Code.

2019 Energy Code: HERS Verifications

The **Home Energy Rating System (HERS) webpage** has been updated with an announcement for multifamily ventilation HERS verifications. When constructing low-rise multifamily homes under the 2019 Energy Code to meet § 150.0(o)1E, documentation of continuous supply or continuous exhaust ventilation installations must be accompanied by a HERS rater compartment leakage (blower door) test. Early coordination gives builders, installers, and HERS raters time to plan field testing and verification.

Q&A

Solar PV for Multifamily Buildings

Do newly constructed multifamily buildings need to have PV and battery storage under the 2022 Energy Code?

Yes. The prescriptive requirements in § 170.2(f-g) for PV apply to new multifamily buildings. The battery storage requirements in § 170.2(h) apply to new multifamily buildings with more than three habitable stories.

Do alterations to existing multifamily buildings trigger PV and battery storage requirements under the 2022 Energy Code?

No. The prescriptive requirements for PV and battery storage only apply to newly constructed buildings.

Do the PV and battery capacity factors in § 170.2(g-h) of the 2022 Energy Code apply to the entire building for a mixed occupancy in which multifamily is more than 80% of the building?

No. The PV and battery capacity factors apply separately to each corresponding space type. For example, if 85% is multifamily, the multifamily capacity factor applies to 85% of the building. If 15% is office space, the office capacity factor applies to other 15% of the building.

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title24@energy.ca.gov

CALL
800-772-3300 Toll free in CA
916-654-5106 Outside CA

HOURS 8 a.m.–12 p.m. and 1 p.m.–4:30 p.m.

When calculating PV, is the entire building considered a multifamily building for a senior living facility with a community dining room?

Yes. Since the dining area is part of the living facility, the entire building would be multifamily. The dining area would only be considered a restaurant if it is designed to serve outside customers. Depending on the number of habitable stories, the PV requirements in the 2022 Energy Code § 170.2(f-g) will apply to the entire building.

Does the multifamily PV exception when the minimum PV system size specified by section 170.2(f) is less than 1.8 kW apply per building?

Yes. Exception 2 to § 170.2(f) applies to each building (not individual dwelling units) if the minimum PV size specified is less than 1.8 kW**,** then no PV is required for that building.

Multifamily Water Heating

Will PV need to support the solar thermal requirements when using a central heat pump water heater in the 2022 Energy Code?

No. The 2022 Energy Code does not have a solar thermal requirement for central HPWHs.

Multifamily Common Use Areas

Are the 2022 Energy Code requirements for multifamily common use areas treated the same as the dwelling units?

No. The requirements that apply to common areas are treated more like nonresidential spaces. Common use areas are defined in Part 2 of Title 24 as private use areas within multifamily residential facilities where the use of these areas is limited exclusively to owners, residents, and their guests. The areas may be defined as rooms, spaces, or elements inside or outside of a building.

FOR MORE INFORMATION

Online Resource Center (ORC): www.energy.ca.gov/orc

Home Energy Rating System (HERS): www.energy.ca.gov/HERS

Acceptance Test Technician Certification Provider Program (ATTCP): www.energy.ca.gov/ATTCP

2019 Approved Compliance Software: https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2019-building-energy-efficiency-2

EDITOR

Amie Brousseau

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Building Standards Office

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CALIFORNIA ENERGY COMMISSION

CEC-400-2022-012

Issue 137 | January - March 2022

BLUEPRINT

CALIFORNIA ENERGY COMMISSION

EFFICIENCY DIVISION

IN THIS ISSUE

For additional help with the Energy Code see Energy Code Ace's **online offerings** of trainings, tools, and resources.

2022 Energy Code: Nonresidential Summary

One of the significant changes in the *2022 Building Energy Efficiency Standards* (Energy Code) for nonresidential, hotel and motel buildings is the newly added prescriptive requirement for photovoltaic (PV). This and other changes include:

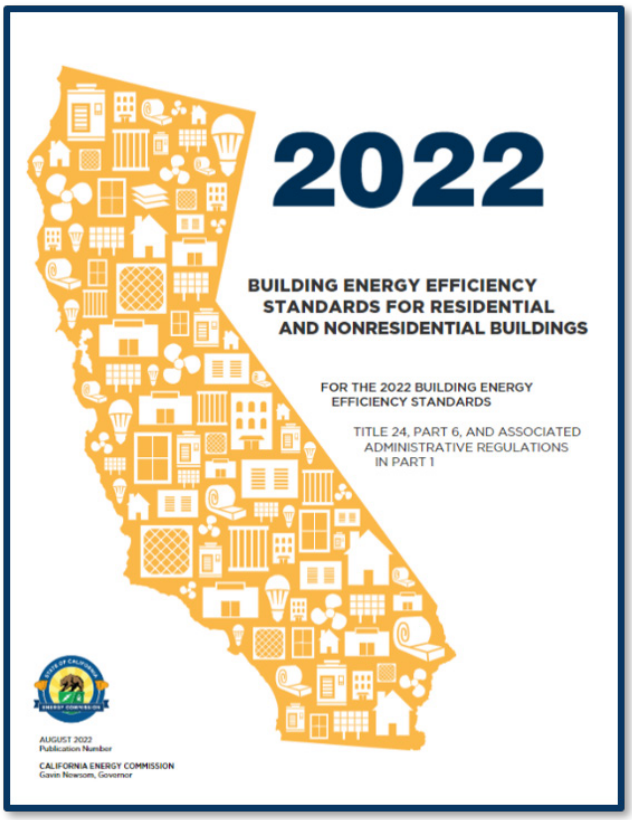

Figure 1: 2022 Energy Code

PV and Energy Storage

- New prescriptive requirements for PV and energy storage systems (ESS) for specific nonresidential occupancies, hotel and motel buildings per Section 140.10.
- California Energy Commission (CEC) approved community shared solar PV system, or other shared renewable electric generation system, and shared energy storage system may be used to meet the PV or ESS requirements using the performance compliance method per Section 10-115.

Envelope

- Cool roof prescriptive requirement updates in Section 140.3(a)1A.
- Air barrier prescriptive requirement updates in Section 140.3(a)9 and Table 140.3-A.
- Prescriptive Table 140.3-B updates for metal-framed wall U-factors; adds climate zones for fenestration values.

Indoor Lighting

- Mandatory occupant sensing controls for office spaces greater than 250 square feet per Section 130.1(c)5-6.
- Automatic daylighting controls for secondary sidelit daylit zones become mandatory; automatic daylighting controls must reduce controlled lighting power to 10 percent or less when adequate daylighting is available per Section 130.1(d).
- Power adjustment factor updates in Table 140.6-A for daylight continuous dimming plus OFF controls, occupant sensing controls in offices larger than 250 square feet, and demand responsive lighting controls.
- Combines lighting power allowances in the area category method for greater flexibility in Table-140.6-C.
- Lighting power density allowance updates in Table 140.6-B, Table 140.6-C, Table 140.6-D, and Table 140.6-G.
- Adds additional testing method for partial daylighting acceptance testing in Reference Appendix Nonresidential NA7.6.

Outdoor Lighting

- Lighting zones 1-3 definition updates according to U.S. Census designations for rural, urban cluster, and urban areas in Table 10-114-A (Figure 2).
- Lighting power allowance updates for general hardscape lighting in Table 140.7-A.
- Updates to specific applications in Table 140.7-B, addition of security camera application.
- The term cutoff has been replaced with the term shielding, since these both refer to the same luminaire distribution features.

Mechanical

- HVAC efficiency updates in Table 110.2-A through Table 110.2-N.
- Mandatory requirement updates for ventilation and indoor air quality; revised requirements for demand control ventilation in Section 120.1.
- Expands mandatory occupant sensor ventilation control (occupied-standby) to large office spaces in Section 120.2.
- Duct leakage testing requirements become mandatory per Section 120.4.

TABLE 10-114-A LIGHTING ZONE CHARACTERISTICS AND RULES FOR AMENDMENTS BY LOCAL JURISDICTIONS

Zone	Ambient Illumination	State wide Default Location	Moving Up to Higher Zones	Moving Down to Lower Zones
LZ0	Very Low	Undeveloped areas of government designated parks, recreation areas, and wildlife preserves.	Undeveloped areas of government designated parks, recreation areas, and wildlife preserves can be designated as LZ1 or LZ2 if they are contained within such a zone.	Not applicable
LZ1	Low	Rural areas, as defined by the 2010 U.S. Census. These areas include: single or dual family residential areas, parks, and agricultural zone districts, developed portion of government designated parks, recreation areas, and wildlife preserves. Those that are wholly contained within a higher lighting zone may be considered by the local government as part of that lighting zone.	Developed portion of a government designated park, recreation area, or wildlife preserve, can be designated as LZ2 or LZ3 if they are contained within such a zone. Retail stores, located in a residential neighborhood, and rural town centers, as defined by the 2010 U.S. Census, can be designated as LZ2 if the business operates during hours of darkness.	Not applicable.
LZ2	Moderate	Urban clusters, as defined by the 2010 U.S. Census. The following building types may occur here: multifamily housing, mixed use residential neighborhoods, religious facilities, schools, and light commercial business districts or industrial zoning districts.	Special districts within a default LZ2 zone may be designated as LZ3 or LZ4 by a local jurisdiction. Examples include special commercial districts or areas with special security considerations located within a mixed-use residential area or city center.	Special districts may be designated as LZ1 by the local jurisdiction, without any size limits.
LZ3	Moderately High	Urban areas, as defined by the 2010 U.S. Census. The following building types may occur here: high intensity commercial corridors, entertainment centers, and heavy industrial or manufacturing zone districts.	Special districts within a default LZ3 may be designated as a LZ4 by local jurisdiction for high intensity nighttime use, such as entertainment or commercial districts or areas with special security considerations requiring very high light levels.	Special districts may be designated as LZ1 or LZ2 by the local jurisdiction, without any size limits.
LZ4	High	None.	Not applicable.	Not applicable.

Figure 2: Table 10-114-A Lighting Zone Characteristics

- Adds heat pump space heating prescriptive requirements for certain occupancies per Section 140.4(a).
- Fan power prescriptive requirement updates to Section 140.4(c).
- New economizer exceptions for certain dedicated outside air systems (DOAS) configurations in Section 140.4(e).
- Adds prescriptive requirements for DOAS in Section 140.4(p).
- Adds prescriptive requirements for exhaust air heat recovery in Section 140.4(q).

Electrical Power Distribution

- Demand responsive controls for controlled receptacles added to Section 110.12.

Covered Processes

- Adds mandatory requirements for transcritical carbon dioxide (CO_2) refrigeration systems in Section 120.6(a-b).
- Adds mandatory requirements for compressed air systems in Section 120.6(e).
- Adds mandatory requirements for controlled environmental horticulture systems in Section 120.6(h).
- Adds mandatory requirements for steam traps in Section 120.6(i).
- Adds mandatory requirements for computer rooms, including uninterruptible power supplies in Section 120.6(j).
- Revisions to prescriptive requirements for computer rooms in Section 140.9(a).
- Adds prescriptive requirements for laboratory and factory exhaust systems Section 140.9(c).

Significant changes for multifamily and single-family residential summaries will be highlighted in future Blueprints. Download final documents on the **2022 Energy Code webpage**.

2019 Compliance Software Updates

Updated versions of EnergyPro 8.3 and Integrated Environmental Solutions Virtual Environment Title 24 2019 (IES VE T24 2019) Version 1.1 are approved for demonstrating performance compliance with the 2019 Energy Code. Permit applications made on or after January 1, 2022, must use the newest versions. More information is available on the **2019 approved computer compliance programs webpage**.

All previous software versions expired December 31, 2021. Please see all of the CBECC and third-party **residential software expiration dates** and **nonresidential software expirations dates.**

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HOURS 8 a.m.–12 p.m. and 1 p.m.–4:30 p.m.

New Resources

The *2019 Significant Changes to the California Energy Code, 2019 Edition* is available on the **overview webpage** of the Online Resource Center. The guidebook was developed by the International Code Council (ICC) in partnership with the CEC and the California Building Officials (CALBO).

ATTCP Frequently Asked Questions

The **Acceptance Test Technician Certification Provider Program FAQs webpage** has been updated to include which 2019 Energy Code forms must be recorded with an ATTCP for compliance.

Q&A

Solar PV for Nonresidential Buildings

Do newly constructed unconditioned warehouses need to have PV and energy storage under the 2022 Energy Code?

No. The prescriptive requirements for PV and energy storage apply to conditioned warehouses depending on climate zone.

Do alterations to existing nonresidential buildings trigger PV and energy storage requirements under the 2022 Energy Code?

No. The prescriptive requirements for PV and energy storage only apply to newly constructed buildings.

Nonresidential Indoor Lighting Alterations

Does removing walls and rewiring the lighting controls for a tenant improvement trigger the 2019 Energy Code for the controls?

Yes. Section 141.0(b)2I states that alterations to lighting wiring are considered alterations to the lighting system. This project will trigger the mandatory lighting control requirements in Sections 110.9 and 130.1 for the controls being rewired.

Does rewiring lighting controls require the existing luminaires to meet the 2019 Energy Code if they are not being altered?

No. Per Section 141.0(b)2I, if fewer than 10 percent of luminaires are altered (relocated, replaced, modified, or added), the existing luminaries are not required to meet the 2019 Energy Code.

FOR MORE INFORMATION

Online Resource Center (ORC): www.energy.ca.gov/orc

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CALIFORNIA ENERGY COMMISSION

CEC-400-2022-002

Issue 136 | October - December 2021

BLUEPRINT

CALIFORNIA ENERGY COMMISSION
EFFICIENCY DIVISION

IN THIS ISSUE

For additional help with the 2019 Energy Code see Energy Code Ace's **online offerings** of trainings, tools, and resources.

Nonresidential Acceptance Testing Reminder

The California Energy Commission (CEC) expects authorities having jurisdiction (AHJ) to enforce the mechanical systems acceptance test technician (ATT) requirements for all nonresidential permit applications submitted on or after October 1, 2021. The six-month period for training and implementation of additional ATTs has come to an end. The mandatory requirement that any person performing a mechanical systems acceptance test in a nonresidential building must be certified as an ATT took effect on April 14, 2021.

Mechanical and lighting ATTs must be trained, certified, and overseen by an acceptance test technician certification provider (ATTCP) to perform nonresidential acceptance testing for lighting controls or mechanical systems. Lighting controls acceptance testing by a certified ATT became mandatory on July 1, 2014.

The AHJ should only accept nonresidential certificates of acceptance (NRCA) that have an ATTCP logo for mechanical and lighting projects permitted on or after October 1, 2021. The ATTs are required to use the ATTCP database system to record testing results and generate NRCAs. All NRCA forms ending in -A (Figure 1) will need to be completed by a certified ATT through an ATTCP website.

The CEC offers training on the lighting and mechanical ATTCP programs. The course provides a basic overview of the responsibilities and benefits to the builder, contractor, ATT, and building inspector.

Additional information is available on the **ATTCP FAQ webpage**.

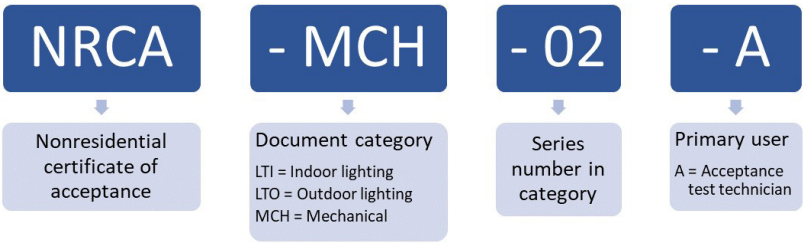


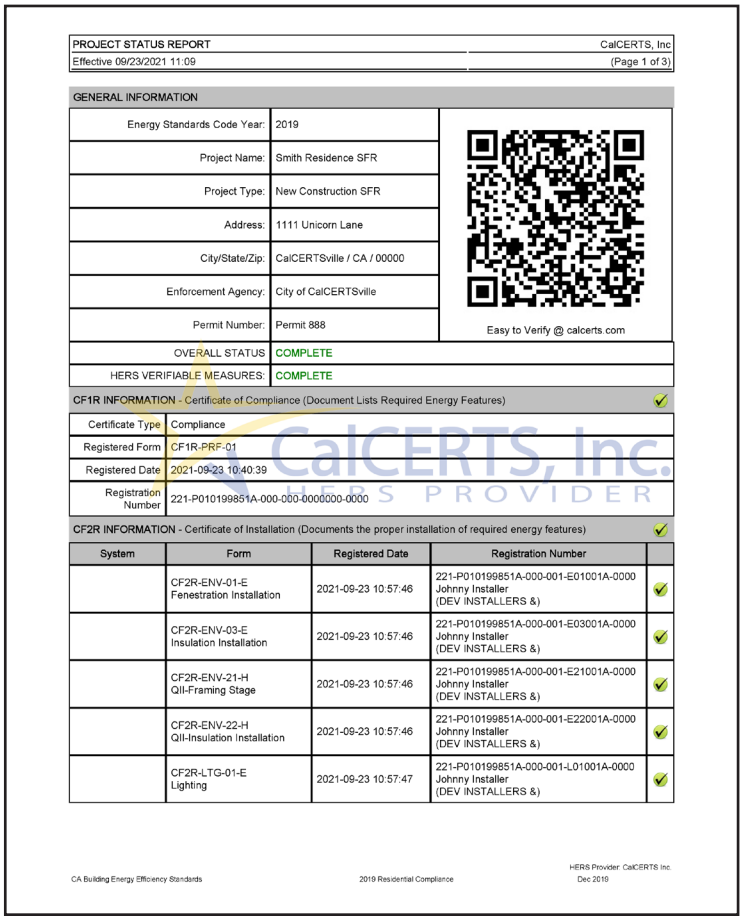
Figure 1: Nonresidential Form Name Example

HERS Registry Project Status Report

The project status report (PSR) is available for any residential project that is registered with an approved HERS Provider. The PSR summarizes the status of all compliance documents for the project, including the certificates of compliance (CF1R), installation (CF2R), and verification (CF3R). Enforcement agencies can access the PSR directly through the HERS registries. This provides enforcement agencies the opportunity to verify the completion of the CF1R, CF2R, and CF3R documents online. Enforcement agencies can request that applicants submit a printed PSR prior to final inspection.

To determine if a project is ready for a final inspection, both the overall compliance and HERS measures status should be marked complete. If the project is marked complete, this indicates that all the compliance documents have been completed and signed in the registry. The PSR can help reduce the number of documents submitted to the enforcement agency and assist with compliance verification.

CalCERTS (Figure 2) and CHEERS (Figure 3) registries have this report available. For more information visit the **CalCERTS web site** and the **CHEERS web site.**



PROJECT STATUS REPORT — CalCERTS, Inc
Effective 09/23/2021 11:09 — (Page 1 of 3)

GENERAL INFORMATION

Energy Standards Code Year:	2019
Project Name:	Smith Residence SFR
Project Type:	New Construction SFR
Address:	1111 Unicorn Lane
City/State/Zip:	CalCERTSville / CA / 00000
Enforcement Agency:	City of CalCERTSville
Permit Number:	Permit 888
OVERALL STATUS	COMPLETE
HERS VERIFIABLE MEASURES:	COMPLETE

Easy to Verify @ calcerts.com

CF1R INFORMATION - Certificate of Compliance (Document Lists Required Energy Features) ✓

Certificate Type	Compliance
Registered Form	CF1R-PRF-01
Registered Date	2021-09-23 10:40:39
Registration Number	221-P010199851A-000-000-0000000-0000

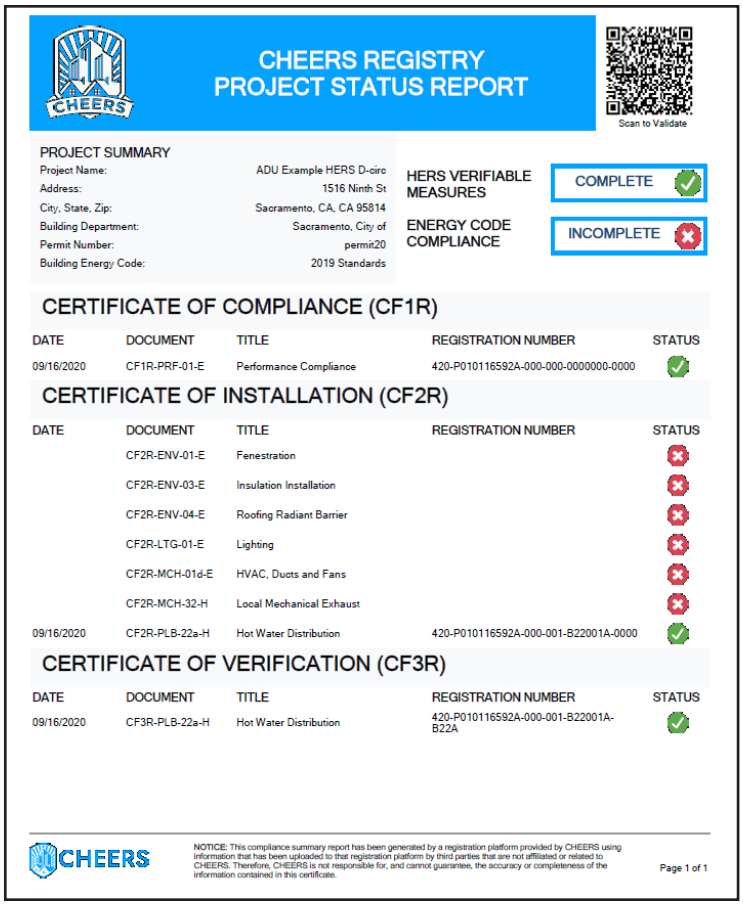
CF2R INFORMATION - Certificate of Installation (Documents the proper installation of required energy features) ✓

System	Form	Registered Date	Registration Number	
	CF2R-ENV-01-E Fenestration Installation	2021-09-23 10:57:46	221-P010199851A-000-001-E01001A-0000 Johnny Installer (DEV INSTALLERS &)	✓
	CF2R-ENV-03-E Insulation Installation	2021-09-23 10:57:46	221-P010199851A-000-001-E03001A-0000 Johnny Installer (DEV INSTALLERS &)	✓
	CF2R-ENV-21-H QII-Framing Stage	2021-09-23 10:57:46	221-P010199851A-000-001-E21001A-0000 Johnny Installer (DEV INSTALLERS &)	✓
	CF2R-ENV-22-H QII-Insulation Installation	2021-09-23 10:57:46	221-P010199851A-000-001-E22001A-0000 Johnny Installer (DEV INSTALLERS &)	✓
	CF2R-LTG-01-E Lighting	2021-09-23 10:57:47	221-P010199851A-000-001-L01001A-0000 Johnny Installer (DEV INSTALLERS &)	✓

CalCERTS, Inc. HERS PROVIDER

CA Building Energy Efficiency Standards — 2019 Residential Compliance — HERS Provider: CalCERTS Inc. Dec 2019

Figure 2: CalCERTS PSR



CHEERS REGISTRY
PROJECT STATUS REPORT

Scan to Validate

PROJECT SUMMARY

Project Name:	ADU Example HERS D-circ
Address:	1516 Ninth St
City, State, Zip:	Sacramento, CA, CA 95814
Building Department:	Sacramento, City of
Permit Number:	permit20
Building Energy Code:	2019 Standards

HERS VERIFIABLE MEASURES — COMPLETE ✓
ENERGY CODE COMPLIANCE — INCOMPLETE ✗

CERTIFICATE OF COMPLIANCE (CF1R)

DATE	DOCUMENT	TITLE	REGISTRATION NUMBER	STATUS
09/16/2020	CF1R-PRF-01-E	Performance Compliance	420-P010116592A-000-000-0000000-0000	✓

CERTIFICATE OF INSTALLATION (CF2R)

DATE	DOCUMENT	TITLE	REGISTRATION NUMBER	STATUS
	CF2R-ENV-01-E	Fenestration		✗
	CF2R-ENV-03-E	Insulation Installation		✗
	CF2R-ENV-04-E	Roofing Radiant Barrier		✗
	CF2R-LTG-01-E	Lighting		✗
	CF2R-MCH-01d-E	HVAC, Ducts and Fans		✗
	CF2R-MCH-32-H	Local Mechanical Exhaust		✗
09/16/2020	CF2R-PLB-22a-H	Hot Water Distribution	420-P010116592A-000-001-B22001A-0000	✓

CERTIFICATE OF VERIFICATION (CF3R)

DATE	DOCUMENT	TITLE	REGISTRATION NUMBER	STATUS
09/16/2020	CF3R-PLB-22a-H	Hot Water Distribution	420-P010116592A-000-001-B22001A-B22A	✓

CHEERS

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Page 1 of 1

Figure 3: CHEERS PSR

2019 Compliance Software Update

Updated versions of CBECC-Res 2019.2.0 and CBECC-Com 2019.2.0 were approved September 1, 2021, for demonstrating performance compliance with the 2019 Building Energy Efficiency Standards (Energy Code). Permit applications made on or after January 1, 2022, must use CBECC-Res 2019.2.0 or CBECC-Com-2019.2.0. More information for CBECC-Res 2019.2.0 or CBECC-Com 2019.2.0 updates are available on the **2019 approved computer compliance programs webpage**.

Previous software versions are approved for demonstrating performance compliance with the 2019 Energy Code until December 31, 2021. Please see all of the CBECC and third-party **residential software expiration dates** and **nonresidential software expirations dates.**

New Resources on the ORC

The Online Resource Center (ORC) has a new 2019 Energy Design Rating fact sheet on the **overview webpage**.

The ORC has new 2019 Energy Code lighting videos on the **lighting webpage.**

The videos are designed to increase knowledge and implementation of code-compliant lighting in nonresidential and residential buildings.

Nonresidential

- Indoor Lighting Controls Requirements and Technologies – Multi-level Lighting Controls
- Acceptance Testing Compliance Process
- Outdoor Lighting Alterations

Residential

- Reference Joint Appendix JA8

The videos were developed by the University of California, Davis, California Lighting Technology Center (CLTC) with funding from Southern California Edison, in collaboration with RMS Energy Consulting, LLC, and the CEC.

Solar Assessment Tools Updated

The **solar assessment tools webpage** has been updated with additional approved tools and links. These tools can be used to verify and document the shading conditions of an installed solar photovoltaic (PV) system as part of the PV requirements for the 2019 Energy Code. The tools may also confirm an exception to the PV requirements has been met.

Q&A

Solar Ready for Mixed Use Occupancies

Does a nonresidential building with 1-story of habitable space and a 12-story parking garage need to meet solar ready requirements?

Yes. Per **Section 110.10(a)**, solar ready is required since there is only 1 habitable story in the 12-story building.

The habitable space is a 2,000 square foot office with 1,000 square feet of roof area. The parking garage is 12 stories high, and the entire 12th floor is 50,000 square feet of parking area. Is solar ready area calculated based on the entire roof square footage on the building?

No. **Exception 5 to 110.10(b)1B** applies to areas that are designed and approved

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for vehicular traffic and parking exempting the 50,000 square foot garage roof area. The required solar ready access area should be no less than 15 percent of the total roof area of the 1,000 square foot roof at the lower habitable floor.

Electric Resistance Water Heaters

Can electric resistance water heaters be used prescriptively in newly constructed low-rise residential buildings?

No. Per prescriptive **Section 150.1(c)8** electric resistance water heaters are not allowed. However, the performance approach allows trade-offs of more efficient items that may make up for the large penalty that will occur. All water heaters need to meet the mandatory efficiency requirement in the **2019 Water Heater Efficiency Guide**. Heat pump water heaters are the 2019 prescriptive baseline for all-electric construction, as this is the most efficient option.

Can electric resistance water heaters be used prescriptively in additions to low-rise residential additions?

No. If the project includes adding another water heater as part of the addition, then the requirement under **Section 150.2(a)1D** is triggered, which refers to **Section §150.1(c)8**.

Can electric resistance water heater be used prescriptively for low-rise residential alterations?

Yes, if natural gas is not connected to the location of the existing water heater per **Section 150.2(b)1Hiiid**. If gas is connected, the water heater must be a gas, propane, or heat pump water heater per **Section 150.2(b)1Hiiia-c**. Electric resistance water heaters may be used through the performance approach if the compliance penalty can be overcome through trade-offs. See the **Residential Water Heater Alterations Guide** for more information.

FOR MORE INFORMATION

Online Resource Center (ORC): www.energy.ca.gov/orc

Home Energy Rating System (HERS): www.energy.ca.gov/HERS

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CALIFORNIA ENERGY COMMISSION

CEC-400-2021-015

Issue 135 | July - September 2021

BLUEPRINT

CALIFORNIA ENERGY COMMISSION

EFFICIENCY DIVISION

IN THIS ISSUE

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2022 Energy Code Adopted

The California Energy Commission (CEC) adopted the 2022 Building Energy Efficiency Standards (Energy Code). The 2022 Energy Code will go into effect on January 1, 2023, following approval by the California Building Standards Commission.

Homes and businesses use nearly 70 percent of California's electricity and are responsible for a quarter of the state's greenhouse gas (GHG) emissions. Over the next 30 years, the Energy Code is estimated to provide $1.5 billion in energy cost savings and reduce 10 million metric tons of GHGs, equivalent to taking nearly 2.2 million cars off the road for a year.

Each update to the Energy Code guides the construction principles for buildings to better withstand extreme weather, lower energy costs, and reduce climate and air pollution. Expanded adoption of new energy-efficient technologies will help reduce costs of these products over time.

The 2022 Energy Code focuses on several key areas in newly constructed buildings:

Heat Pumps

Heat pumps consume less energy and produce fewer emissions than gas-powered units. The 2022 Energy Code encourages electric heat pump technology for space heating and water heating for single-family, multifamily, and select commercial buildings, such as schools, offices, banks, libraries, retail, and grocery stores.

Electric Ready

The 2022 Energy Code establishes electric-ready requirements for single-family homes to allow owners to switch from gas to electric for heating, cooking, and appliances. The electric-ready requirement also prepares the home for future installation of a battery storage system.

Solar and Battery Storage

The 2022 Energy Code includes solar photovoltaic (PV) system and battery storage standards for certain nonresidential buildings, such as high-rise multifamily, hotel, motel, tenant space, office, medical office, clinical, retail, grocery

stores, restaurants, schools, and civic spaces. The update makes clean energy available on-site and complements California's progress toward a 100 percent clean electricity grid.

Indoor Air Quality

The 2022 Energy Code strengthens ventilation standards to improve indoor air quality. The update recognizes differences in pollutants created by natural gas and electric cooking, as well as the role of indoor air volume in pollution concentrations. The update adds duct sealing requirements for central shaft ventilation systems and relaxes insulation requirements for ducts in conditioned space.

Lighting

Updates to the lighting requirements improve clarity and consistency. The 2022 Energy Code provides default outdoor lighting zones, updates the tables for nonresidential lighting power allowances, and removes the lumen maintenance test from Reference Joint Appendix JA8.

Multifamily

The 2022 Energy Code consolidates low-rise and high-rise multifamily requirements into a set of dedicated chapters. The update adds Sections 160.0–160.9 for mandatory requirements, Sections 170.0–170.2 for performance and prescriptive compliance approaches, and Sections 180.0–180.4 for additions, alterations, and repairs. The CBECC-Com compliance software will be integrated to demonstrate performance compliance with the multifamily requirements.

For more information, view the **executive summary** (Figure 1) and visit the **2022 Energy Code webpage**.

Figure 1: Executive Summary

New Resources on ORC

The Online Resource Center (ORC) has new 2019 Energy Code lighting videos on the **lighting webpage**. The videos (Figure 2) are designed to increase knowledge and implementation of code-compliant lighting in nonresidential and residential buildings.

Nonresidential

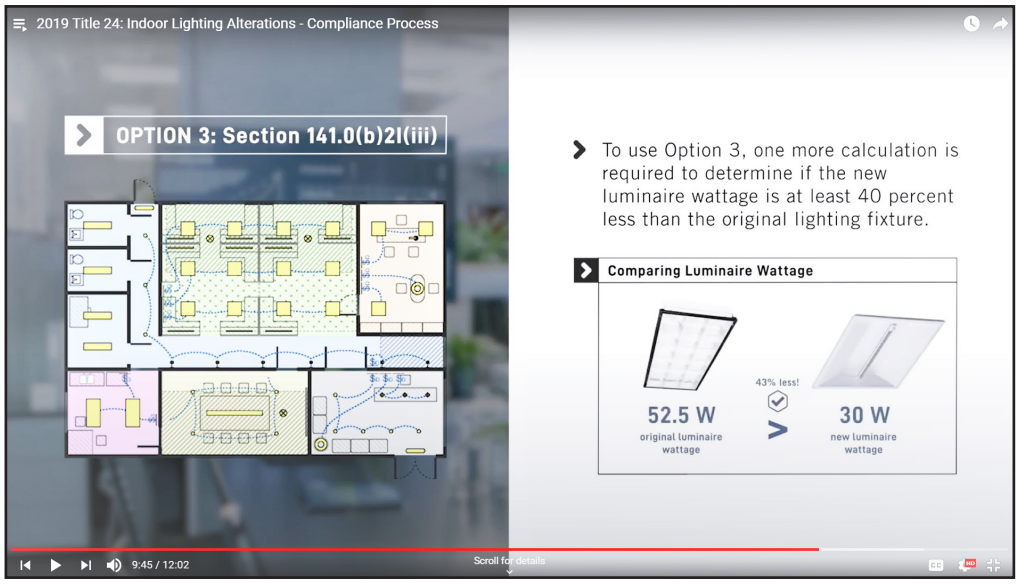
- Indoor Lighting Controls Requirements and Technologies – Manual Area Controls
- Lighting Controls and Envelope Acceptance Testing Requirements
- Indoor Lighting Alterations – Compliance Process
- Outdoor Lighting and Sign Control Requirements

Residential

- High-Efficacy Requirements for Residential Light Sources

The videos were developed by the University of California, Davis, California Lighting Technology Center (CLTC) with funding from Southern California Edison, in collaboration with RMS Energy Consulting, LLC, and the CEC.

Figure 2: Indoor Lighting Alterations Video



2019 Compliance Manual Errata

Errata for the **2019 Residential Compliance Manual** and the **2019 Nonresidential Compliance Manual** have been published.

These errata address revisions to the compliance manuals including minor changes to correct grammatical errors, clarify meaning, and clean up confusing language. View the errata on the **2019 Energy Code webpage**.

Q&A

PV for Newly Constructed Detached Buildings

Does a new detached building classified as occupancy U (like a pool house, rec room, art studio, etc.) on a residential lot need to meet the solar PV requirements in Energy Code Section 150.1?

Yes. A conditioned, newly constructed building classified as U-building on a residential lot needs to meet the PV requirements in **Section 150.1(c)14** of the Energy Code. Using the prescriptive method, the annual PV electrical output Equation 150.1-C allows for an input of zero for the number of dwelling units. Using the performance method, the PV calculation is automated to at least one dwelling unit.

ENERGY STANDARDS HOTLINE

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Can a new detached accessory dwelling unit (ADU) add PV modules to the existing PV on the main house if the ADU has a separate utility meter and the added PV kilowatts will not specifically serve the ADU?

Yes. Adding new PV modules to an existing PV system will satisfy the PV requirements in **Section 150.1(c)14** as long as the added PV modules are on the same residential lot as the ADU. The Energy Code does not regulate whether the added PV modules are serving the ADU meter or the main house meter. Any added PV modules must also comply with other parts of the building code as applicable.

Ultraviolet (UV) Lights for Sanitation

Do UV lighting fixtures used for sterilizing need to comply with the mandatory lighting control requirements in Section 130.1 and power allowance requirements in Section 140.6 of the Energy Code?

No. UV lighting for sanitation that does not provide any visual illumination is not regulated by the Energy Code. The UV fixtures should be controlled separately from any visual illumination components.

Does a lighting luminaire that includes an element for sterilization (whether UV or other type) need to meet the lighting control and power allowance requirements?

Yes. The luminaire must comply with lighting control requirements in **Section 130.1** and the power allowance requirements in **Section 140.6** for the visual illumination. However, the sanitation element is exempt from these requirements and should be controlled separately from the lighting element of the luminaire.

FOR MORE INFORMATION

Online Resource Center (ORC): www.energy.ca.gov/orc

Home Energy Rating System (HERS): www.energy.ca.gov/HERS

Acceptance Test Technician Certification Provider Program (ATTCP): www.energy.ca.gov/ATTCP

2019 Approved Compliance Software: https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2019-building-energy-efficiency-2

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IN THIS ISSUE

For additional help with the 2019 Energy Code see Energy Code Ace's **online offerings** of trainings, tools, and resources.

Nonresidential Acceptance Testing

The mandatory requirement that any person performing a mechanical systems acceptance test in a nonresidential building must be certified as an acceptance test technician (ATT) took effect on April 14, 2021. In order to allow a reasonable time for training and implementation of additional ATTs, the California Energy Commission (CEC) expects authorities having jurisdiction to enforce the mechanical systems ATT requirements for all nonresidential permit applications submitted on or after October 1, 2021.

What is acceptance testing?

Acceptance testing for nonresidential buildings was adopted in 2005 as part of the Building Energy Efficiency Standards (Energy Code) **Section 10-103.2.** Lighting controls acceptance testing by an ATT became mandatory on July 1, 2014.

Acceptance testing generally includes three phases: documentation inspection, construction inspection, and functional testing. Acceptance testing confirms that contractors install equipment, controls, and systems that operate as required by the Energy Code. Acceptance testing verifies the installed energy efficient equipment is performing as expected, achieving lasting cost savings.

What is an ATT?

An ATT is an installation technician that is trained, certified, and overseen by an acceptance test technician certification provider (ATTCP) to perform nonresidential acceptance testing for lighting controls or mechanical systems. ATTs conduct required tests, submit test results and certificates to enforcement agencies, and are employed by certified acceptance test employers. These employers are trained and certified by an ATTCP.

What is the role of the ATTCP?

ATTCPs are professional organizations approved by the CEC to provide a training curriculum for technicians, employers, certification procedures,

complaint resolution (including disciplinary procedures), quality assurance, and accountability measures. ATTCPs monitor acceptance test employers and ATTs who perform acceptance testing.

Certificates of acceptance

Nonresidential certificates of acceptance (NRCA) provide enforcement agencies the data necessary to verify compliance. The NRCAs have the ATTCPs logo, representing accountability for the work of the certified ATTs. The enforcement agency should not accept NRCAs that do not have an ATTCP logo. The CEC provides sample NRCAs, without ATTCP logos, for reference. ATTs are required to use the ATTCP database system to record testing results and generate NRCAs.

The ATTCPs use the database system to track the completed work of ATTs and acceptance test employers for quality assurance.

Enforcement agencies can rely on the compliance documentation with an ATTCP logo and be assured that the quality assurance checks on all certified technicians are being performed.

Outreach and education

CEC staff is available to provide training on the ATTCP program for lighting controls and mechanical systems. Topics addressed include why acceptance testing is required, what is the role of the ATTCP, when ATT certification became mandatory, and how contractors and inspectors can use the ATTCP program to their best advantage. The intent of this course is to provide a basic understanding of the responsibilities and benefits to the builder, contractor, ATT, and the building inspector.

Additional information is available on the **ATTCP webpage**.

Figure 1: ATTCP Counter Card

Approved ATTCPs for lighting controls

- **California Advanced Lighting Controls Training Program (CALCTP)**
- **National Lighting Contractors Association of America (NLCAA)**

Approved ATTCPs for mechanical systems

- **California State Pipe Trades Council (CSPTC)**
- **National Energy Management Institute Committee (NEMIC)** also referred to as the Testing, Adjusting, and Balancing Bureau (TABB)
- **National Environmental Balancing Bureau (NEBB)**
- **Refrigeration Service Engineers Society (RSES)**

New Resources on ORC

The Online Resource Center (ORC) has new 2019 Energy Code resources. The ATTCP Inspector's Field Sheet, training presentation, and counter card (Figure 1) are available on the **ORC ATTCP webpage**.

Presentations for the 2019 Energy Code are available on these ORC web pages

- **Accessory Dwelling Units**
- **Commissioning**
- **Covered Processes Overview**
- **Residential Envelope**
- **Nonresidential Envelope**
- **Residential Water Heating**
- **Nonresidential Water Heating**
- **Solar Ready**

Repeal of Title 20 Self-Contained Lighting Controls

Effective March 16, 2021, amendments to Title 20 self-contained lighting controls and other minor amendments under **Docket 20-AAER-01** were approved with an immediate effective date.

This rulemaking includes the removal of the appliance type called "self-contained lighting controls" from Title 20, which includes the removal of definitions; efficiency standards; and testing, marking, and certification requirements related to this appliance. Self-contained lighting controls are no longer required to comply with Title 20 to be sold or offered for sale in California.

Self-contained lighting controls are no longer required to be certified to the Modernized Appliance Efficiency Database System (MAEDbS) and future certifications of this appliance type will not be possible. All self-contained lighting controls listed in MAEDbS were recently archived. Affected manufacturers were notified separately though a MAEDbS communication.

Other non-substantive changes include removal of the minimum light output requirement for LED portable luminaires, updates to data submittal requirements for certain appliances, updates to reflect current federal law, and other miscellaneous changes to improve the readability of Title 20.

Please visit the **Title 20 Appliance Efficiency Regulations webpage** for more information.

2019 Energy Code Software Approved

The CEC approved Integrated Environmental Solutions (IES) Virtual Environment Title 24 2019 Version 1.0 as an alternative compliance software program to demonstrate compliance for nonresidential buildings under the 2019 Energy Code.

All approved software versions, with corresponding approval and expiration dates, are listed on the **2019 compliance software webpage**. Check back often for approved version updates.

Q&A

Nonresidential Indoor Lighting Alterations

What is a one-for-one luminaire alteration?

A one-for-one luminaire alteration is either replacement of whole luminaires one-for-one, in which the only electrical modifications involves disconnecting the existing luminaire and reconnecting the replacement luminaire, or when components of a luminaire are modified without replacing the entire luminaire. Adding luminaires and relocating existing luminaires are not one-for-one alterations.

If luminaires are permanently removed as part of a greater one-for-one alteration, does the project still qualify as a one-for-one alteration?

Yes. Permanently removing existing luminaires does not disqualify this alteration from being considered one-for-one.

If luminaires are permanently removed as part of a greater one-for-one alteration, does the wattage of the removed luminaires count toward the 40 percent reduction in lighting power?

Yes. This wattage does count toward the 40 percent reduction under **Section 141.0(b)2Iiii** of the 2019 Energy Code.

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Does permanently removing existing luminaires trigger indoor lighting alteration requirements?

No. Permanent removal of existing luminaires does not trigger indoor lighting alteration requirements. If other alterations are made to the lighting system in conjunction with permanent removal of luminaires, such as relocating 10 percent of existing luminaires, this may trigger alteration requirements.

If lamps and ballasts are replaced, or lamps and drivers are replaced in a luminaire, is this an alteration?

Yes. Replacing lamps and ballasts, or lamps and drivers in a luminaire, is an alteration. These alterations can qualify as one-for-one alterations under **Section 141.0(b)2Iiii** of the 2019 Energy Code. Replacements of lamps alone, ballasts alone, or drivers alone is not considered an alteration per **Exception 5 to Section 141.0(b)2I**.

PV for Accessory Dwelling Units (ADU)

Can an existing photovoltaic (PV) system be used to meet the PV requirement for a newly constructed detached ADU?

No. The ADU must have a newly installed PV system to meet the requirements.

Can new PV modules be added to the existing PV system to meet the PV requirement for a newly constructed detached ADU?

Yes. New PV modules may be added to an existing system to meet the 2019 Energy Code requirements. The new PV modules must be part of the ADU's permit application, sized per the Energy Code, and comply with other parts of the building code as applicable.

For more information on PV requirements for ADUs, see **Blueprint 129.**

FOR MORE INFORMATION

Online Resource Center (ORC): www.energy.ca.gov/orc

Home Energy Rating System (HERS): www.energy.ca.gov/HERS

Acceptance Test Technician Certification Provider Program (ATTCP): www.energy.ca.gov/ATTCP

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IN THIS ISSUE

Snow Load and PV

The 2019 Building Energy Efficiency Standards (Energy Code) includes solar photovoltaic (PV) system requirements for all newly constructed low-rise residential buildings per **Section 150.1(c)14**. The California Building Code (CBC, Title 24, Part 2) and the California Residential Code (CRC, Title 24, Part 2.5) require PV systems, including modules, supports, and attachments, to meet the design and installation requirements for high snow loads in American Society of Civil Engineers (ASCE) Standard 7-16. Simultaneous compliance with the code requirements of the Energy Code, CBC, and CRC should be met, when feasible, in all newly constructed low-rise residential buildings.

The California Energy Commission (CEC) has confirmed that the solar PV system requirement does not apply to buildings that cannot meet the PV system structural requirements in the CBC and CRC due to high snow loads.

Site-specific conditions will determine whether a PV system can be installed safely to meet high snow loads. Building permit applicants must address the issues under their control to meet PV system high snow load structural requirements. These include the specific characteristics of the PV modules, method of installation, roof slope and design, and PV module location.

Steps that can be taken to meet high snow load structural requirements include the following:

- Use three-rail mounting or other installation practices to make PV modules resilient to high snow loads.
- Design roof slopes and PV module locations to maximize the roof slope and allow the PV system to qualify as unobstructed slippery surfaces.
- Modify roof designs, roof locations, or PV module mounting to avoid unnecessary snow accumulation or snow sliding off the roof to undesirable locations on the site.

Local enforcement agencies should ensure that practical approaches are taken to design homes that facilitate the installation of PV systems whenever possible.

Experienced designers in high snow load areas have demonstrated that PV systems can be successfully installed with attention to all ASCE Standard 7-16 requirements. Local enforcement agencies are encouraged to provide technical assistance to ensure that designs of roofs and PV systems are modified to meet the demanding conditions of high snow loads.

The CEC recognizes that regardless of best efforts to install PV systems, building sites that receive an extreme amount of snow can have design snow load requirements that are greater than what PV modules are rated to withstand based on ASCE Standard 7-16. Additional information can be found in the **CEC staff report** on the Town of Truckee petition to the solar PV requirement.

New Fact Sheets on ORC

New 2019 Energy Code fact sheets are available on the following Online Resource Center (ORC) web pages:

Solar

- Solar PV System

Overview

- Healthcare Exceptions Summary

Covered Processes

- Commercial Kitchens
- Commercial Refrigeration
- Compressed Air Systems
- Computer Rooms & Data Centers
- Elevators
- Enclosed Parking Garages
- Escalators & Moving Walkways
- Laboratory & Factory Exhaust
- Process Boilers
- Refrigerated Warehouses

Virtual Compliance Assistant for NRCC Forms

Announcing the **Virtual Compliance Assistant** tool provided by Energy Code Ace. This tool fills in the Nonresidential Certificate of Compliance (NRCC) forms by directing users to answer a series of simple and direct questions about the project. The tool then confirms that the project complies with the Energy Code. The tool is great for beginners and experts. It gives users the ability to work efficiently as a design project team. Some of the special features include:

- One form per building component
- Simple questions
- Tips and tricks
- Built-in compliance logic
- Guides users to enter correct information
- Requires only applicable tables
- Energy Code section references
- Save forms progress
- Assign tasks to responsible person

All 2019 NRCC forms are available with the Virtual Compliance Assistant:

- Commissioning
- Domestic Water Heating
- Envelope
- Electrical Power Distribution
- Indoor Lighting
- Mechanical
- Outdoor Lighting
- Process Systems
- Sign Lighting

For additional help with the 2019 Energy Code see Energy Code Ace's **online offerings** of trainings, tools, and resources.

Updated Lighting Videos

Four newly updated 2019 Energy Code lighting videos have been added to the **ORC Lighting webpage**. These videos are designed to increase knowledge and implementation of code-compliant lighting in nonresidential and residential buildings.

Nonresidential

- Introduction to Lighting Control Systems
- Introduction to Lighting Controls Acceptance Testing
- Introduction to Lighting Alterations

Residential

- Overview of High Efficacy Lighting

The videos were developed by the California Lighting Technology Center (CLTC) at UC Davis with funding from Southern California Edison (SCE), in collaboration with RMS Energy Consulting, LLC, and the CEC. The videos links will open in the CLTC website.

Q&A

Accessory Dwelling Unit (ADU) Scenarios

When building an ADU on top of an existing detached garage, is this an addition?

Yes. Sharing a common ceiling/floor of an existing structure is considered an addition, regardless if the existing structure is an unconditioned space. Figure 1.

Figure 1: ADU over detached garage

Is it still an addition if the new ADU is built side-by-side with the existing garage?

Yes. A new ADU that shares a common wall with an existing garage is an addition. Figure 2.

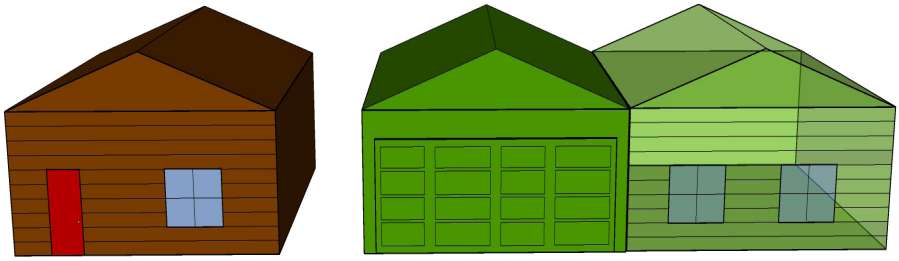

Figure 2: ADU adjacent to detached garage

When a newly built ADU is attached to the existing home by a breezeway, or covered walkway, is this an addition?

No. This is a newly constructed building. It does not share a common wall or common (or adjacent) ceiling/floor. Figure 3.

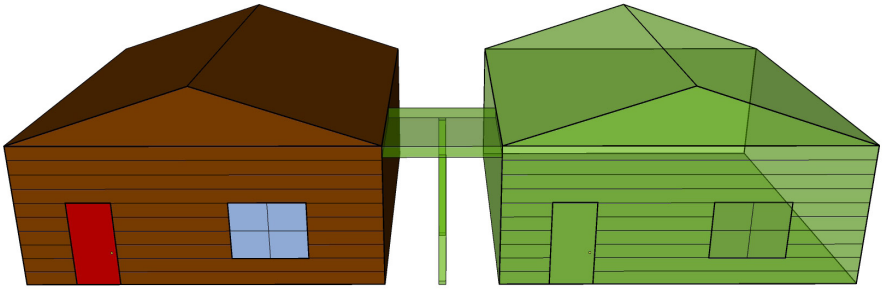

Figure 3: ADU attached with breezeway

When converting existing conditioned space, like a conditioned basement, into an ADU or junior ADU, is this an addition?

No. This is an alteration. Energy Code requirements may be triggered if altering a component which is covered by the Energy Code. Some examples of alterations that are covered by the Energy Code are newly installed water heaters or mini-split HVAC systems, lighting upgrades, changes to the building envelope, etc.

For additional ADU scenarios, see **Blueprint 122**.

The CEC welcomes feedback on Blueprint.
Please contact the editor at: **Title24@energy.ca.gov.**

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Kitchen Range Hood HERS Verification for Alterations

Does a kitchen-only remodel require HERS verification of the kitchen range hood?

Yes. Kitchens with range hoods which previously met the local exhaust requirements of **Section 150.0(o)2B** must continue to meet those requirements post-alteration. This requires HERS verification of the newly installed kitchen range hood.

FOR MORE INFORMATION

Online Resource Center (ORC): www.energy.ca.gov/orc

Home Energy Rating System (HERS): www.energy.ca.gov/HERS

Acceptance Test Technician Certification Provider Program (ATTCP): www.energy.ca.gov/ATTCP

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EFFICIENCY DIVISION

IN THIS ISSUE

Local Ordinances Exceeding the 2019 Energy Code

Local jurisdictions may adopt building efficiency ordinances that are more stringent than statewide Building Energy Efficiency Standards (Energy Code) requirements. Local jurisdictions wishing to enforce locally adopted energy standards are required to apply to the California Energy Commission (CEC) for approval. The CEC has updated the **local ordinance webpage** with information on how to apply and reflects currently approved local ordinances. This webpage will be updated as approvals are completed for applications submitted in the future. (Figure 1)

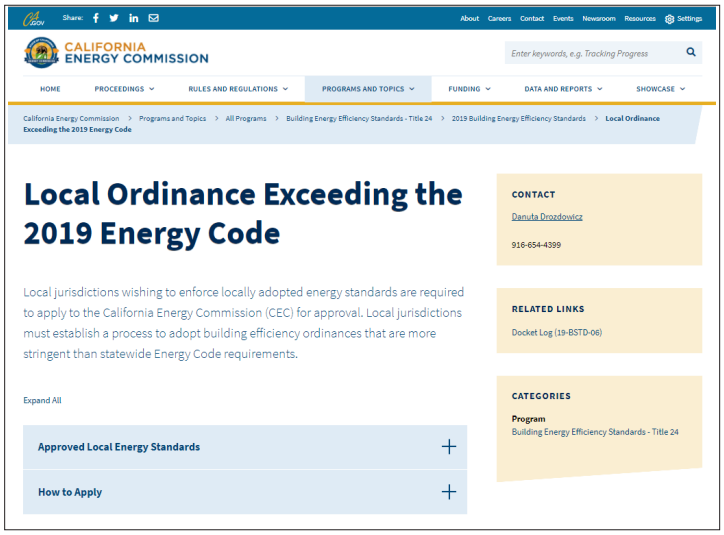

Figure 1: Local Ordinance Webpage

Fillable 2019 NRCA Forms

The nonresidential certificate of acceptance (NRCA) forms for 2019 Energy Code compliance are now fillable. The new fillable forms simplify compliance and are easier for users to complete. These fillable compliance forms are available on the **Energy Code Ace website** under the *Get Forms* tab.

The NRCA-LTI and NRCA-LTO lighting forms will need to be completed by a lighting acceptance test technician (ATT) through an ATT Certification Provider's website. For more information on the acceptance testing program and to find an ATT, visit the **ATTCP webpage**.

Solar Assessment Tools Updated

The **solar assessment tools webpage** has been updated with additional approved tools and links. These tools can be used to verify and document the shading conditions of an installed solar photovoltaic (PV) system as part of the PV requirements for the 2019 Energy Code. The tools may also confirm an exception to the PV requirements has been met.

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Temporary Fenestration Labels

The Energy Code requires that U-factor and SHGC values on temporary window labels are certified by the National Fenestration Rating Council (NFRC). Any manufactured fenestration products that are not certified by the NFRC must incorporate an alternative temporary label that lists the Energy Code default U-factor values from **Table 110.6-A** and default SHGC values from **Table 110.6-B**.

Section 10-111 of the Energy Code states that no other values for U-factor or solar heat gain coefficient (SHGC) are allowed on the temporary labels. This restricts a manufacturer from using its own values, even when these values are on a separate label in addition to the code-compliant NFRC label or CEC-default label.

The U-factor and SHGC values on the temporary NFRC labels (Figure 2) attached to each newly installed product should be checked at inspection. Temporary labels should only be removed after the building has passed inspection.

Manufacturer-generated simulated performance alternative label values should not be accepted. Manufacturer-generated values do not meet the Energy Code fenestration labeling requirements and cannot be used to verify code compliance. Please see the **CEC fenestration labeling regulatory advisory,** which still applies to the 2019 Energy Code.

Figure 2: Sample NFRC Label

For information on NFRC certification and labeling, visit the **NFRC website**.

The CEC welcomes feedback on Blueprint. Please contact the editor at: **Title24@energy.ca.gov.**

Certification of Mini-Split Systems and Multi-Split Systems

Mini-split systems are heating and cooling systems that allow you to control the temperatures in individual rooms or spaces. Mini-split systems have two main components, an outdoor compressor and condensing unit, and an indoor air-handling unit (evaporator).

There are different configurations of mini-splits available. Single indoor unit mini-split systems, also called single-split systems, have one outdoor unit and a single indoor unit. Multi-head mini-split systems have one outdoor unit that serves two or more indoor units connected with a single refrigeration circuit and operate in unison in response to a single indoor thermostat. Multiple-split or multi-split systems have one outdoor unit and two or more indoor units connected with a single refrigeration circuit that operate independently in response to at least two indoor thermostats. (Figure 3)

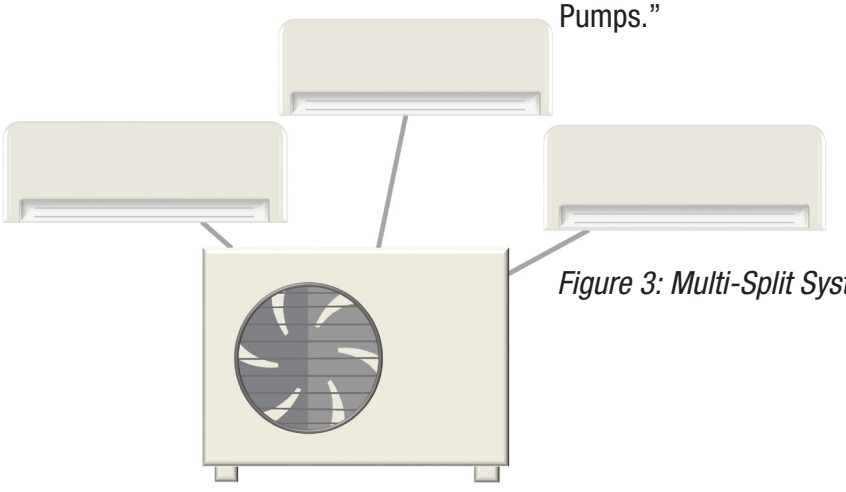

Figure 3: Multi-Split System

Variable capacity heat pump (VCHP) systems are cooling and heating systems with outdoor units consisting of multiple compressors or a single variable capacity compressor. Both mini-split and multi-split systems can be VCHP systems.

A low-static VCHP system is a ducted system that has a blower and coil system that produces greater than 0.01 inch of water and a maximum of 0.35 inch of water external static pressure when operating at the cooling full-load air volume rate not exceeding 400 cubic feet per minute per rated ton of cooling.

Non-VCHP mini-split and multi-split heating and cooling systems must be certified to the CEC's **Title 20 Modernized Appliance Efficiency Database System (MAEDbS)**. Non-VCHP mini-split or multi-split systems have one, single-speed compressor. If it has only cooling capability, it must be listed in MAEDbS under "Central Air Conditioners." If it has heating only, or both heating and cooling capability, it must be listed in MAEDbS under "Central Heat Pumps."

VCHP mini-split and multi-split systems do not need to be certified to MAEDbS. However, they must be certified to the Air Conditioning, Heating, and Refrigeration Institute (AHRI) and listed in the AHRI database. The CEC issued a **regulatory advisory** for this in 2011. The advisory is effective until the model data listed with AHRI is imported into MAEDbS.

Q&A

Mini-Split and Multi-Split Performance Modeling Credit

Is there a performance compliance credit available for installation of a mini-split or multi-split system that does not have more than one compressor or a variable capacity compressor?

Yes. Mini-split and multi-split single speed systems may receive credit for having ducts entirely within conditioned space. HERS verification is required to verify that the location of the heads are completely within conditioned space.

Is there performance compliance credit available for installation of a VCHP mini-split or multi-split system?

Yes. VCHP mini-split and multi-split systems may qualify for a 5 percent cooling credit, a 12 percent heating credit, or both, when the performance method of compliance is used. HERS

verification is required to confirm:

- Location of the indoor units and ducts are entirely within conditioned space
- Refrigerant charge
- Airflow to all habitable spaces either by use of a ductless indoor unit located in the room, or by use of ducts connected directly to the supply air outlet of a ducted indoor unit
- Zones greater than 150 square feet have a wall-mounted thermostat

Is there a performance compliance credit available for installation of a ducted mini-split or multi-split system?

Yes. Ducted VCHP mini-split and multi-split systems can receive the same heating and cooling efficiency credits as non-ducted VCHP systems. However, if the ducted indoor unit operates continuously by default, the credit will be lower than the credit given to ductless systems due to the additional fan power used by continuous fan operation in ducted systems. (Ductless systems do not have a fan energy penalty for continuous fan operation.) To receive the heating and cooling credits, ducted systems must be certified to the CEC by the manufacturer to be a low-static VCHP system. Note that certification to the CEC is in addition to the AHRI listing. To receive the VCHP credit, HERS verification is required for the items listed under non-ducted systems and the following additional items:

- Low leakage ducts located entirely inside conditioned space
- Minimum airflow rate (350 cfm/ton)
- Air filter sizing
- Air filter maximum pressure drop

Is there performance compliance credit available for ducted systems that do not operate continuously by default?

Yes. Ducted systems can receive a performance credit for reduced fan energy if the system does not operate continuously by default. To receive the credit, the manufacturer must include the non-continuous fan feature in the certification to the CEC. Certification of non-continuous fan operation is not required, but performance credit cannot be used when it is not certified. HERS verification of the fan operation is required to receive the credit. The credit for non-continuous fan operation is not available for non-ducted systems.

Information on the requirements for eligibility, verification, and how to certify ducted low-static systems to the CEC can be found on the **Ducted VCHP Certification webpage**. For more on modeling VCHP systems via the performance approach, see **Section 8.4.3 of the CBECC-Res User Manual**.

For additional help with the 2019 Energy Code: See Energy Code Ace's **online offerings** of trainings, tools, and resources.

Electric Resistance Space Heating - Natural Gas Availability

Is electric resistance space heating allowed by the Energy Code when using the performance method of compliance?

Yes. Electric resistance space heating is allowed when using the performance method of compliance. However, the nonresidential standard design is based on a building using gas space heating, making compliance with electric resistance space heating very difficult. Low-rise residential standard design is based on a heat pump system.

Is electric resistance space heating allowed by the Energy Code when using the prescriptive method of compliance?

No. Electric resistance space heating is not allowed when using the prescriptive method of compliance. However, there are some exceptions for nonresidential, high-rise residential, and hotel/motel occupancies listed in **Section 140.4(g)**. There are no exceptions for low-rise residential prescriptive compliance. If electric resistance is used for low-rise residential buildings, the performance method of compliance must be used.

For nonresidential, high-rise residential, hotel and motel occupancies, Exception 5 to Section 140.4(g), what does "where natural gas is not available" mean and how is it applied to newly constructed buildings, additions, and alterations?

To address natural gas availability a definition was added to **Section 100.1** in the 2019 Energy Code: *"For newly constructed buildings, natural gas is available if a gas service line can be connected to the site without a gas main extension. For additions and alterations, natural gas is available if a gas service line is connected to the existing building."*

Is there an exception for any building occupancy allowing the use of electric resistance space heating if the authority having jurisdiction (AHJ) passes an ordinance banning or restricting the use of natural gas space heating?

No. The AHJ's decision to ban or restrict the use of natural gas does not meet the additional requirements of **Exception 5 to Section 140.4(g)**, which stipulates that the building must:

- Not be a high-rise residential or hotel/motel building
- Have a conditioned floor area no greater than 5,000 square feet
- Be in an area where a natural gas service line cannot be connected to the site without a gas main extension

Is there an alternative to electric resistance space heating if the AHJ bans natural gas?

Yes. An alternative to natural gas space heating is an electric heat pump system. Heat pumps are allowed prescriptively by the Energy Code for all building occupancies for new construction, additions, and alterations, even when natural gas is available.

How does the new definition for natural gas availability apply to low-rise residential buildings?

It mainly applies to additions and alterations, since the 2019 Energy Code allows for an all-electric pathway in newly constructed low-rise residential buildings.

Water Heater Alterations in Outdoor Closets

When replacing an existing water heater, can a heat pump water heater (HPWH) be installed in an attached outdoor closet (Figure 4) when using the prescriptive approach?

Yes. Per **Section 150.2(b)1Hiiib or 150.2(b)1Hiiic**, a HPWH may be installed as long as it is not located outdoors. When placed in a closet, airflow must be provided per manufacturer's installation requirements (vents, louvers, etc.).

Can a replacement HPWH be installed in an attached outdoor closet using the prescriptive approach when the existing water heater is in another location?

Yes. Regardless of where the existing water heater is located, a replacement HPWH may be installed in an attached outdoor closet.

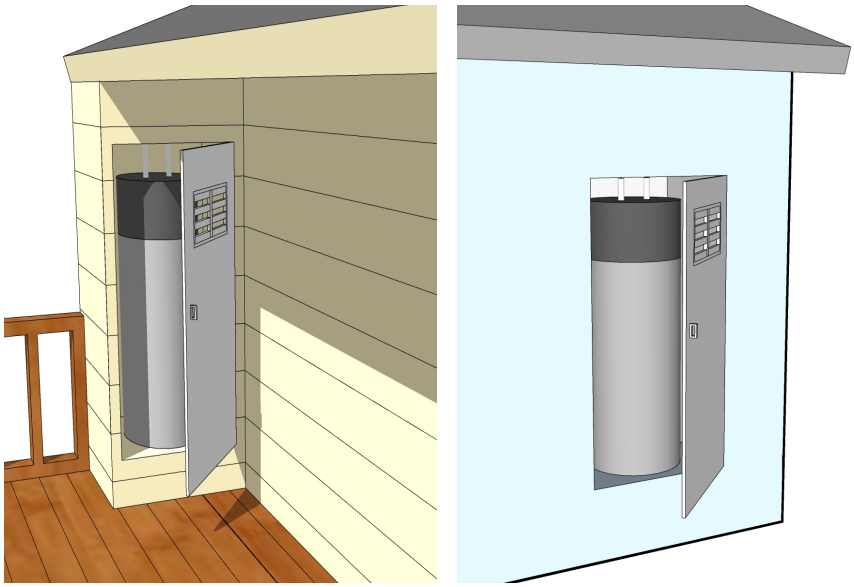

Figure 4: Water Heater Outdoor Closets

If the existing water heater uses gas, can a replacement HPWH be installed in an attached outdoor closet when using the prescriptive approach?

Yes. Regardless of the existing water heater fuel type, a replacement HPWH may be installed in an attached outdoor closet.

Can a HPWH be installed in an attached outdoor closet for newly constructed buildings or additions when using the prescriptive approach?

No. Prescriptively per **Section 150.1(c)8Aiv** or **150.1(c)8Av**, the HPWH must be located inside the building (garage, basement, attic, or conditioned space). The performance approach may be used to model the HPWH in an attached outdoor closet, which may require other efficiency trade-offs to demonstrate compliance.

Community Solar Compliance Option

Does a subdivision with 10 or more single family residences that uses an approved community solar compliance option per Section 10-115 still have to comply with the solar ready requirements for each individual residence?

Yes. In new subdivisions with 10 or more homes, the solar ready provisions of **Section 110.10** are mandatory for low-rise residential buildings that do not have an installed PV system, unless it qualifies for an exception to **Section 110.10.** This applies to low-rise multifamily buildings as well.

FOR MORE INFORMATION

Online Resource Center (ORC): www.energy.ca.gov/orc

Home Energy Rating System (HERS): www.energy.ca.gov/HERS

Acceptance Test Technician Certification Provider Program (ATTCP): www.energy.ca.gov/ATTCP

2019 Approved Compliance Software: https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2019-building-energy-efficiency-2

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IN THIS ISSUE

Nonresidential Mechanical Acceptance Testing

For several codes cycles, the Building Energy Efficiency Standards (Energy Code) have included requirements for acceptance testing of mechanical systems in nonresidential buildings by a certified acceptance test technician (ATT). Until now, the minimum thresholds of 300 certified ATTs and ATT certification training available to all qualified technicians had not been met. These prerequisites for mandating compliance with the mechanical ATT regulations are now fulfilled.

As a result, California Energy Commission (CEC) staff is preparing a recommendation to the CEC to move forward with implementation of the mechanical ATT mandate. The CEC is expected to adopt staff's recommendations at its business meeting in January 2021. After adoption, a phased plan for enforcement will be announced. All technicians performing mechanical acceptance tests on nonresidential building projects must then be trained and certified by an approved Acceptance Test Technician Certification Provider (ATTCP). The certified ATT's will be held to quality assurance standards, with penalties for nonconformance.

Staff is seeking input from all stakeholders by encouraging participation in the upcoming workshop and public comment period, or by contacting staff directly. For more information on the ATTCP program and to participate in developing the implementation plan, please refer to the **Mechanical Acceptance Test Technician Implementation Proceedings**. Any comments or questions may be submitted to the CEC's docket (**20-ATTCP-01**). Visit the **ATTCP web page** for more information.

New 2019 Energy Code Resources Available on the ORC

The Online Resource Center (ORC) is available virtually during this time of social distancing. The CEC continues to publish new resources on the ORC. These resources are free, available on demand, and ADA compliant.

2019 HERS Reference Card

The 2019 Home Energy Rating System (HERS) Reference Counter Card (Figure 1) is now available on the ORC **HERS web page**.

2019 ATTCP Reference Card

The 2019 ATTCP Reference Counter Card (Figure 2) is now available on the ORC **ATTCP web page**.

2019 Water Heater Guides

Two 2019 water heater guides are now available on the ORC **Water Heating web page**:

- 2019 Water Heater Efficiency Guide
- 2019 Water Heater Alterations Counter Card (Figure 3)

2019 Energy Code Envelope Air Sealing Fact Sheet

The 2019 Envelope Air Sealing fact sheet is available on the ORC **Envelope web page**. This fact sheet covers both residential and nonresidential envelope air sealing requirements.

Figure 1: HERS Reference Card

Figure 2: ATTCP Reference Card

CALIFORNIA ENERGY COMMISSION | EFFICIENCY DIVISION

Water Heater Alterations Individual Dwelling Units

2019 Title 24 Building Energy Efficiency Standards

Is Natural Gas Connected to Existing Water Heater's Location?	What type can I install prescriptively?	What can I install under the performance approach?
YES	**Natural gas or propane** - tank or tankless (§150.2(b)1Hiiia)	Any type that uses no more energy than the standard design (gas or propane tankless[4]; or heat pump[5], if proposed is electric). Must use CEC-approved compliance software (§150.2(b)2B)
	Heat pump - (§150.2(b)1Hiiib; Climate Zones 1-15)[1]	
	Heat pump - NEEA Tier 3 or higher (§150.2(b)1Hiiic; Climate Zones 1-15)[2]	
NO	**Consumer Electric** - tank or tankless (§150.2(b)1Hiiid)[3]	
All existing accessible and newly installed piping must be insulated per §150.2(b)1Hi.		

Figure 3: Water Heater Alterations Card

2019 Energy Code Presentations

These 2019 Energy Code presentations are available on the ORC:

- **What's New Overview**
- **Residential Updates**
- **Residential HVAC**
- **Nonresidential HVAC**
- **Residential Lighting**
- **Nonresidential Indoor Lighting**
- **Nonresidential Outdoor Lighting**
- **Nonresidential Sign Lighting**
- **Nonresidential Electrical Power Distribution Systems**
- **Insulation and QII Requirements**
- **Nonresidential Envelope**

For additional 2019 Energy Code training see Energy Code Ace's **online offerings** for tools, training, and resources.

Energy Code Dynamic Forms Relocated

The 2016 and 2019 Energy Code **dynamic non-HERS residential** and **dynamic nonresidential** fillable compliance forms have been moved from the CEC's website to the **Energy Code Ace website** under the new *Get Forms* tab.

Q&A

Nonresidential Indoor Lighting

Are sidelit daylit zones determined differently for an area adjacent to a window that is recessed in a bay?

No. The sidelit daylit zones will be determined the same way as for a window that is not recessed. The primary sidelit daylit zone extends out one window head height deep into the space, and one half a window head height to each side of the rough opening of the window. The only difference is that the sidelit daylit zone of a recessed window will be reduced by the incursion of the bay and exterior walls into the sidelit daylit zone, as shown in Figure 4.

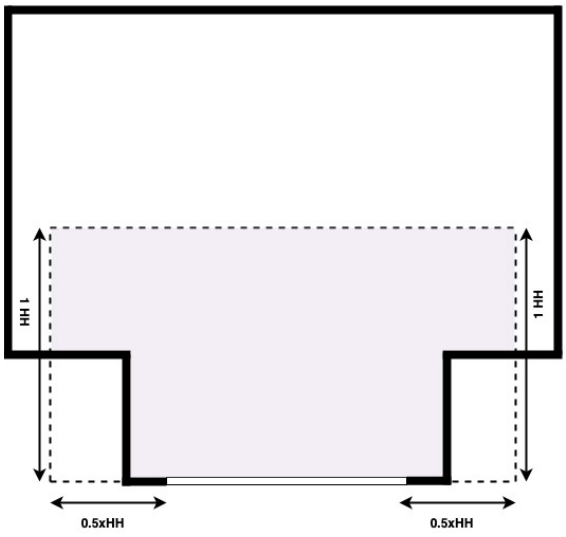

Figure 4: Bay window lighting zones

Do controlled receptacle requirements apply to first-time tenant improvements in a building with multiple tenant shells?

Yes. If the local enforcement agency classifies first-time buildouts (first-generation tenant improvement) as a newly constructed building or space, it must meet all requirements for newly constructed buildings. These requirements include controlled receptacles in **Section 130.5(d)**. Check with the local enforcement agency for its policy on first-generation tenant improvements.

A tenant improvement to an existing space that has been previously developed must meet the alteration requirements for controlled receptacles in **Section 141.0(b)2Piv**. Controlled receptacle requirements will apply only to alterations where there is an entirely new or complete replacement of the electrical power distribution system for the whole building.

Nonresidential Outdoor Lighting Alterations

Can the initial wattage allowance (IWA) be used when calculating the prescriptive lighting power allowance for an outdoor lighting alteration or addition?

Yes. The IWA is a one-time power allowance that can be used for outdoor lighting alterations and additions. IWA use is specific to alterations or additions where the entire site lighting complies with prescriptive outdoor lighting power allowance requirements in Section 140.7.

The IWA is a flat power allowance that applies once to each outdoor lighting project per **Section 140.7(d)1C**. The wattage allowed depends on the outdoor lighting zone of the project as listed in **Table 140.7-A** (Figure 5). The Energy Code assumes that the IWA is used for lighting power allowance calculations when the site is initially designed and restricts double counting the IWA. When altering or adding to an existing outdoor lighting system, the entire site lighting power allowance must be calculated per Section 140.7, including allowances for general hardscape and specific applications. All lighting at the site, including existing, altered, and new luminaires, must comply with the calculated lighting power allowance. This process is similar to lighting power allowance requirements for an entirely new outdoor lighting system. If the entire site lighting power allowance is not considered, the IWA cannot be used.

TABLE 140.7-A GENERAL HARDSCAPE LIGHTING POWER ALLOWANCE

Type of Power Allowance	Lighting Zone 0[3]	Lighting Zone 1[3]	Lighting Zone 2[3]		Lighting Zone 3[3]		Lighting Zone 4[3]
	Asphalt/Concrete	Asphalt/Concrete	Asphalt	Concrete[2]	Asphalt	Concrete[2]	Asphalt/Concrete
Area Wattage Allowance (AWA)	No allowance[1]	0.018 W/ft²	0.023 W/ft²	0.025 W/ft²	0.025 W/ft²	0.03 W/ft²	0.03 W/ft²
Linear Wattage Allowance (LWA)		0.15 W/lf	0.17 W/lf	0.4 W/lf	0.25 W/lf	0.4 W/lf	0.35 W/lf
Initial Wattage Allowance (IWA)		180 W	250 W	250 W	350 W	350 W	400 W

[1]Continuous lighting is explicitly prohibited in Lighting Zone 0. A single luminaire of 15 Watts or less may be installed at an entrance to a parking area, trail head, fee payment kiosk, outhouse, or toilet facility, as required to provide safe navigation of the site infrastructure. Luminaires installed shall meet the maximum zonal lumen limits as specified in Section 130.2(b).

[2]Where greater than 50% of the paved surface of a parking lot is finished with concrete. This does not extend beyond the parking lot, and does not include any other General Hardscape areas.

[3]Narrow band spectrum light sources with a dominant peak wavelength greater than 580 nm – as mandated by local, state, or federal agencies to minimize the impact on local, active professional astronomy or nocturnal habitat of specific local fauna – shall be allowed a 2.0 lighting power allowance multiplier.

Figure 5: Table 140.7-A

Example: A portion of an existing illuminated parking lot is being converted into an outdoor dining area with new outdoor dining lighting added.

In this scenario, the IWA can be used if the entire site complies with outdoor lighting power allowance requirements in Section 140.7. The lighting power allowance includes the general hardscape for existing parking lot lighting and specific application for newly added dining area lighting.

The project may also comply if the newly added dining area lighting meets the dining area specific application lighting power allowance, which is listed in **Table 140.7-B**. The existing parking lot lighting is not altered; therefore, general hardscape lighting power allowances would not apply. In this case IWA is not applicable to the project.

Nonresidential Curtain Walls

Do transparent curtain wall sections (Figure 6) need to be modeled separately from opaque curtain wall sections within the same storefront?

Yes. Transparent sections will need to meet the U-factors for curtain wall/storefront fenestration per **Table 140.3-B or C**, and opaque sections will need to meet the U-factors for opaque walls per **Section 120.7(b)6**.

If one or more of the transparent sections is operable, will that also be modeled separately?

Yes. Operable transparent sections will need to meet the U-factor for operable fenestration per **Table 140.3-B or C**.

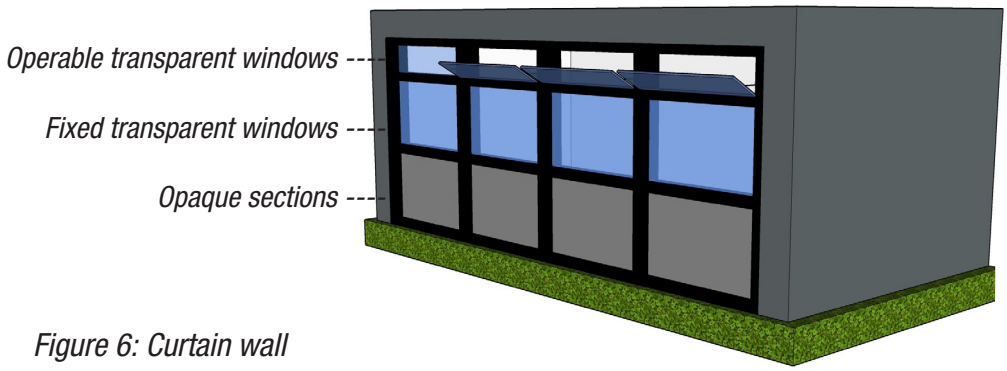

Figure 6: Curtain wall

High-Rise Residential and Low-Rise Residential Kitchen Range Hoods

What is a kitchen range hood?

The Home Ventilating Institute (HVI) definition for a kitchen range hood is:

"A ducted exhauster for use over cooking equipment that captures contaminants by buoyancy and exhausts them. May be a dual-function appliance incorporating microwave and/or clock function. Includes non-powered kitchen range hoods. Ductless range hoods are excluded."

Is a kitchen range hood required to be installed for compliance with the Energy Code Sections 120.1(b)2 and 150.0(o), and local exhaust requirements of ASHRAE 62.2 Section 5?

No. A kitchen range hood is not required to be installed to meet the Energy Code and ASHRAE local exhaust requirements. However, if a range hood is not used to meet the local exhaust requirements, another system must be installed in the kitchen to meet the local exhaust requirements of ASHRAE 62.2 Section 5.

If a range hood is used to meet local kitchen exhaust requirements, what are the mandatory requirements for the range hood airflow and sound level?

When a range hood is used to meet the local kitchen exhaust requirements, it must exhaust a minimum of 100 cubic feet per minute (cfm) to the outdoors and have a sound rating of no more than 3 sones. If the minimum airflow setting for the range hood is 400 cfm or greater, there is no sound requirement.

What are the mandatory airflow and sound level requirements for systems installed to meet local kitchen exhaust requirements that do not use a vented range hood ?

For enclosed kitchens, if an exhaust system other than a range hood is installed for local kitchen exhaust compliance, the system must exhaust a minimum of 300 cfm or provide five air changes per hour (ACH) to the outdoors and have a sound rating of no more than 3 sones. If the minimum airflow setting for the exhaust system is greater than 400 cfm, there is no sound requirement. ASHRAE Standard 62.2-2016 defines an enclosed kitchen as a kitchen whose permanent openings to interior adjacent spaces do not exceed a total of 60 square feet.

For non-enclosed kitchens, if an exhaust system other than a range hood is installed for kitchen exhaust compliance, the system must exhaust a minimum of 300 cfm. There is no air change option for non-enclosed kitchens. There is a maximum sound rating for these exhaust systems

of 3 sones, unless the minimum airflow setting for the exhaust system is greater than 400 cfm.

Does a recirculating range hood with no exhaust to the outdoors meet the mandatory requirements?

No. When a recirculating range hood without outdoor exhaust is installed, another system must also be installed that exhausts to the outdoors and meets the local kitchen exhaust flow rate and sound requirements in ASHRAE 62.2.

Is HERS verification required for kitchen range hoods installed to meet local kitchen exhaust requirements?

Yes. A HERS Rater must verify the installed range hood flow rate, sound rating, and certification. Verification is performed by reviewing the listed flow rate and sound rating in either the HVI database or the Association of Home Appliance Manufacturers (AHAM) database. If the range hood is not listed in one of these databases, it cannot be used to meet local kitchen exhaust requirements.

Is HERS verification required for a kitchen range hood that is installed but not used to meet local exhaust requirements?

No. Installed kitchen range hoods that are not used to meet local kitchen exhaust requirements, such as a recirculating range hood, do not require HERS verification. However, another system must be installed to meet the local kitchen exhaust requirements.

Is HERS verification required for local kitchen exhaust systems other than kitchen range hoods installed to meet kitchen exhaust requirements?

No. HERS verification is required only for kitchen range hoods installed to meet local kitchen exhaust requirements.

Do kitchen range hood and local exhaust requirements apply to additions and alterations?

Yes. In addition to new construction, these requirements also apply to additions and alterations that include new or replacement kitchen range hoods ducted to the outside. Systems that previously met indoor air quality requirements must continue to meet indoor air quality requirements after the additions or alterations are completed.

What forms are used by the installer, acceptance test technician, and HERS Rater to document kitchen range hood compliance?

For high-rise residential buildings:

- The installer reports the installed equipment on the NRCI-MCH-01-E form
- The installer or acceptance test technician reports on the NRCA-MCH-20-H form
- The HERS Rater reports on the NRCV-MCH-32-H form

For low-rise residential buildings:

- The installer reports on the CF2R-MCH-32-H form
- The HERS Rater reports on the CF3R-MCH-32-H form

For more information on local kitchen exhaust and other residential indoor air quality requirements and applicable exceptions, please see Energy Code **Sections 120.1(b)** and **150.0(o)**, **Section 4.6** of the 2019 Residential Compliance Manual, **Section 4.3** of the Nonresidential Compliance Manual, and ASHRAE Standard 62.2-2016.

The CEC welcomes feedback on Blueprint. Please contact the editor at: **Title24@energy.ca.gov.**

Indoor Air Quality

Can a 2-inch (or deeper) filter be installed into a grille or rack designed for a 1-inch filter in order to comply with Sections 120.1(b)1Biia, 120.1(c)1Ci, and 150.0(m)12Biia?

No. To comply with the indoor air quality requirements of the Energy Code, a filter with a thickness greater than one inch cannot be installed in a filter grille or rack that is designed for a filter with a thickness of one inch or less. The installed filter cannot be thicker than the filter grill or the designed filter thickness of the rack.

Residential ADUs

When converting an existing garage into an ADU in a high-rise residential building, do the high-rise residential Energy Code requirements apply to the ADU?

Yes. The building occupancy type determines the compliance approach. If there are four or more habitable stories in the building, the ADU must comply with high-rise residential Energy Code requirements.

Residential Single-Width Headers

Does a single-width header require insulation when modeled in a project without quality insulation installation (QII)?

No. The standard design includes QII with insulated single-width headers and continuous exterior rigid insulation. When using the performance approach, QII can be traded for other building energy efficiencies to meet compliance. There are exceptions for multifamily new construction in climate zone 7, and additions under 700 square feet, where QII is not part of the standard design.

FOR MORE INFORMATION

Online Resource Center (ORC): www.energy.ca.gov/orc

Home Energy Rating System (HERS): www.energy.ca.gov/HERS

Acceptance Test Technician Certification Provider Program (ATTCP): www.energy.ca.gov/ATTCP

2019 Approved Compliance Software: https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2019-building-energy-efficiency-2

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Nonresidential Indoor Lighting Alterations

Under the 2019 Building Energy Efficiency Standards (Energy Code) **Section 141.0(b)2I**, nonresidential indoor lighting alterations requirements are applicable when 10 percent or more of luminaires in an enclosed space are altered. Alterations to the lighting system can include (but are not limited to) replacing, removing, reinstalling, relocating, adding, and modifying luminaires. Alterations to wiring that serves luminaires are considered lighting alterations.

There are three compliance pathways for nonresidential indoor lighting alterations. For the first two compliance pathways, alteration requirements depend on the proposed lighting power:

- Section 141.0(b)2Ii – Lighting power that is greater than 80 percent, and up to 100 percent of the lighting power allowance. The project must meet all mandatory lighting control requirements as applicable (manual area, multilevel, automatic shut-OFF, automatic daylighting, and demand responsive controls).
- Section 141.0(b)2Iii – Lighting power that is 80 percent or less of the lighting power allowance. The project must meet manual area control requirements and automatic shut-OFF control requirements as applicable.

In the third compliance pathway, buildings or tenant spaces that are 5,000 square feet or less may utilize a different method of compliance if meeting specific criteria.

- Section 141.0(b)2Iiii - The lighting alteration must be a one-for-one luminaire alteration and the altered luminaire power must be at least 40 percent lower compared to the pre-alteration wattage. Lighting power allowance calculations are not utilized for this compliance approach. Control requirements include manual area controls and automatic shut-OFF controls as applicable.

Table 141.0-F includes the specific control requirements for each

compliance approach (Figure 1).

Some enclosed spaces may be exempt from the lighting alteration requirements. Here are some examples of spaces or alterations that do not trigger lighting alteration requirements:

- Enclosed spaces where less than 10 percent of luminaires are included in the lighting alteration.
- Enclosed spaces with one luminaire.
- Alterations that are limited to the addition of lighting controls to an existing lighting system.
- Alterations that are limited to the replacement of lamps, ballasts, or drivers. (Replacing lamps and ballast, or lamps and driver is considered an alteration.)

Refer to Section 141.0(b)2I for the specific language related to the indoor lighting alteration requirements and exceptions.

Table 141.0-F – Control Requirements for Indoor Lighting System Alterations

Control Specifications		Projects complying with Section 141.0(b)2Ii	Projects complying with Sections 141.0(b)2Iii and 141.0(b)2Iiii
Manual Area Controls	130.1(a)1	Required	Required
	130.1(a)2	Required	Required
	130.1(a)3	Only required for new or completely replaced circuits	Only required for new or completely replaced circuits
Multi-Level Controls	130.1(b)	Required	Not Required
Automatic Shut Off Controls	130.1(c)1	Required; 130.1(c)1D only required for new or completely replaced circuits	Required; 130.1(c)1D only required for new or completely replaced circuits
	130.1(c)2	Required	Required
	130.1(c)3	Required	Required
	130.1(c)4	Required	Required
	130.1(c)5	Required	Required
	130.1(c)6	Required	Required
	130.1(c)7	Required	Required
	130.1(c)8	Required	Required
Daylighting Controls	130.1(d)	Required	Not Required
Demand Responsive Controls	130.1(e)	Required	Not Required

Figure 1: Table 141.0-F Control Requirements for Indoor Lighting Alterations

Nonresidential Outdoor Lighting Cutoff Requirements

Under the 2019 Energy Code, **Section 130.2(b)** requires nonresidential outdoor luminaires with an initial lumen output of 6,200 lumens or greater to meet luminaire cutoff requirements. This is a change from the 2016 Energy Code cutoff requirements which were triggered for luminaires rated for use with lamps greater than 150 lamp watts. The 2019 Energy Code also now defers to CALGreen Section 5.106.8 for backlight, uplight, and glare (BUG) rating requirements.

CALGreen Code Section 5.106.8 includes additional BUG rating limits for area lighting and for lighting located within a distance of two mounting heights from property lines. The 2019 nonresidential certificate of compliance for outdoor lighting (NRCC-LTO-E) now documents these BUG rating requirements in Table G of the form (Figure 2). The form will automatically populate the maximum allowed BUG

COVID-19 Essential Workers

The CEC is available to support essential workers in the construction field. The CEC has clarified solar photovoltaic and energy storage installers as essential energy workers during COVID-19 response. For more information see the **CEC's clarification notice** and the message from Chair Hochschild on the **CEC's response to COVID-19**.

ratings from CALGreen Table 5.106.8 based on the user input lighting zone and mounting height distance of the luminaire from property lines. For more information on these requirements, refer to CALGreen Section 5.106.8 and Table 5.106.8.

G. CUTOFF REQUIREMENTS (BUG)

Table Instructions: Complete this table for fixtures of ≥ 6,200 initial luminaire lumens indicated on Table F as needing to comply with Cutoff Requirements. Maximum lumens can be found in Title 24, Part 11, Section 5.106.8.

01	02	03	04	05	06	07	08	09	10	11	12	
Name or Item Tag	Complete Luminaire Description	Backlight Rating[2]			Uplight Rating[2]			Glare Rating[2]			Field Inspector	
		Mounting Height from Property Line[1]	Max Allowable Backlight Rating[3]	Backlight Rating Per Design	Lighting Type	Max Allowable Backlight Rating[3]	Uplight Rating Per Design	Mounting Height from Property Line[1]	Max Allowable Glare Rating[3]	Glare Rating Per Design	Pass	Fail
Ltg1	LED wall pack	> 2 MH from property line	No Limit	B3	Area Lighting	U0	U0	> 2 MH from property line	G3	G3	☐	☐
Ltg2	LED cobra hea	> 2 MH from property line	No Limit	B3	Area Lighting	U0	U0	> 2 MH from property line	G3	G3	☐	☐

Reset

Figure 2: NRCC-LTO-E Table G

2019 Energy Code Updated with Navigational Links

An **updated version of the 2019 Energy Code** is now available with embedded navigational links which include:

- Linked Table of Contents
- Linked section references in Table 100.0-A
- Links to sections and tables throughout the Energy Code
- Linked index to reference keywords in sections

Solar Assessment Tools

The 2019 Energy Code includes prescriptive and performance requirements to install solar photovoltaic (PV) systems for newly constructed low-rise residential buildings. As part of the PV requirement, installers must verify and document the shading conditions of the installed PV system as specified in **Reference Joint Appendix JA11.4**. The verification must be done using a solar assessment tool that is approved by the executive director. For a listing of approved tools and more information visit the **solar assessment tools web page**.

Q&A

Nonresidential Indoor Lighting

Do automatic daylighting control requirements apply to luminaires that fall partially within a daylit zone?

Yes. Luminaires that are at least 50 percent in a daylit zone must be included in the zone and meet applicable control requirements for that zone. If the luminaire is less than 50 percent in a daylit zone, it does not need to be included in the zone.

Are multi-segment linear lighting systems treated as a single luminaire?

No. For linear lighting systems that utilize individual luminaires or segments that can be connected together into a single run, each segment of the run is considered an individual luminaire. For example, a 24-foot linear lighting run composed of three 8-foot segments is classified as three 8-foot luminaires.

Do automatic daylighting control requirements apply to linear lighting systems where there are multiple segments wired into a single run?

Yes. In a multi-segment run the individual luminaires and segments that fall within a daylit zone must be controlled separately within the daylit zone in which they fall. For example, a 24-foot run consisting of three 8-foot luminaires are mounted perpendicular to a window, if one 8-foot segment falls in a primary sidelit zone, one segment falls in a secondary sidelit daylit zone, and one segment is not in a daylit zone, each segment must be controlled separately in each type of daylit zone and separate from luminaires not in a daylit zone (Figure 3).

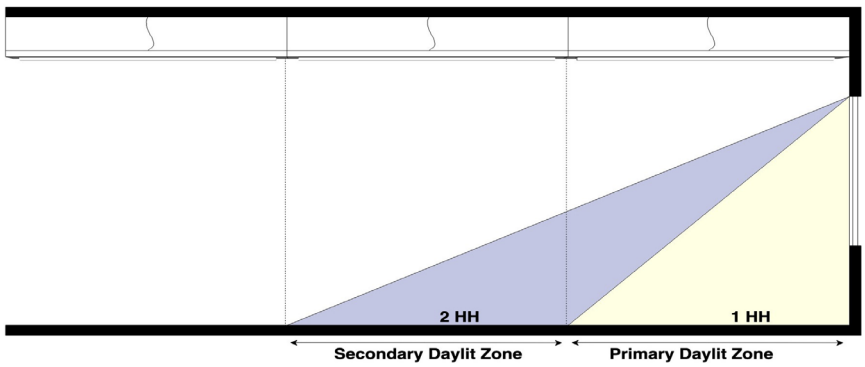

Figure 3: Linear Lighting Primary and Secondary Zones

Nonresidential Outdoor Lighting

For parking lot lighting projects with hardscape other than asphalt or concrete, does the project use the concrete general hardscape lighting power allowance from Table 140.7-A?

Yes. Parking lots where more than 50 percent of the paved surface is material other than asphalt or concrete may use the general hardscape lighting power allowance for concrete hardscape in **Table 140.7-A** of the 2019 Energy Code

TABLE 140.7-A GENERAL HARDSCAPE LIGHTING POWER ALLOWANCE

Type of Power Allowance	Lighting Zone 0[3]	Lighting Zone 1[3]	Lighting Zone 2[3]		Lighting Zone 3[3]		Lighting Zone 4[3]
	Asphalt/Concrete	Asphalt/Concrete	Asphalt	Concrete[2]	Asphalt	Concrete[2]	Asphalt/Concrete
Area Wattage Allowance (AWA)	No allowance[1]	0.018 W/ft²	0.023 W/ft²	0.025 W/ft²	0.025 W/ft²	0.03 W/ft²	0.03 W/ft²
Linear Wattage Allowance (LWA)		0.15 W/lf	0.17 W/lf	0.4 W/lf	0.25 W/lf	0.4 W/lf	0.35 W/lf
Initial Wattage Allowance (IWA)		180 W	250 W	250 W	350 W	350 W	400 W

[1]Continuous lighting is explicitly prohibited in Lighting Zone 0. A single luminaire of 15 Watts or less may be installed at an entrance to a parking area, trail head, fee payment kiosk, outhouse, or toilet facility, as required to provide safe navigation of the site infrastructure. Luminaires installed shall meet the maximum zonal lumen limits as specified in Section 130.2(b).

[2]Where greater than 50% of the paved surface of a parking lot is finished with concrete. This does not extend beyond the parking lot, and does not include any other General Hardscape areas.

[3]Narrow band spectrum light sources with a dominant peak wavelength greater than 580 nm – as mandated by local, state, or federal agencies to minimize the impact on local, active professional astronomy or nocturnal habitat of specific local fauna – shall be allowed a 2.0 lighting power allowance multiplier.

Figure 4: Table 140.7-A

(Figure 4). Per footnote 2 in the table, the concrete allowance can only be used for parking lot hardscape and cannot be used for other types of general hardscape.

Does exterior emergency lighting need to comply with the outdoor lighting power allowance requirements?

No. If the emergency lighting is connected to an emergency power source and is used solely for emergency egress, it does not need to meet the lighting power allowance requirements of Section 140.7.

Does exterior emergency lighting need to comply with the outdoor lighting control requirements?

No. Emergency lighting may also be exempt from the control requirements. Exception 1 to **Section 130.2(c**) provides an exemption to the control requirements for "outdoor lighting not permitted by a health or life safety statute, ordinance, or regulation to be turned OFF or reduced." Confirm with the enforcement agency as to whether this exception applies to the project.

Nonresidential Ventilation Controls and Filtration for Alterations

Do demand control ventilation (DCV) requirements per Sections 120.1(d)3 and 4 apply to alterations and additions?

Yes, if the ventilation system is completely new or completely replaced, then DCV requirements are applicable. For alterations, the alteration must include a complete duct system replacement, ventilation air handler replacement, and controls replacement. If any of these are not included in the alteration, DCV is not required. For an addition, if a completely new system is installed, including new ducts, new air handler, and new controls, DCV is applicable. If any of these are not included in the addition, DCV is not required.

Do the requirements for occupant sensing ventilation control (OSVC) per Section 120.1(d)5 and occupant sensing zone control (OSZC) per Section 120.2(e)3 apply to alterations and additions?

No. OSVC and OSZC requirements do not apply to alterations and additions.

Is MERV 13 filtration required for an altered space conditioning or ventilation system?

Yes. MERV 13 filtration is required when the entire space conditioning system or entire ventilation system is replaced. The alteration must include a complete duct system and air handler replacement. If either of these are not included in the alteration, MERV 13 filtration is not required. However, if filtration is added as a compliance option, a pressure drop adjustment credit can be taken for fan power allowance per **Section 141.0(b)2C** and Table 141.0-D (Figure 5).

Table 141.0-D Fan Power Limitation Pressure Drop Adjustment

Device	Adjustment Credits
Particulate Filtration Credit: MERV 9 through 12	0.5 in. of water
Particulate Filtration Credit: MERV 13 through 15	0.9 in. of water

Figure 5: Table 141.0-D

Residential Filtration for Alterations

Do the MERV 13 filtration requirements apply to low-rise residential HVAC alterations?

Yes, if the alteration to an existing system includes a new or complete replacement duct system, then MERV 13 filtration low-rise residential HVAC requirements will apply. A complete replacement of a duct system includes the replacement of at least 75 percent of the duct system.

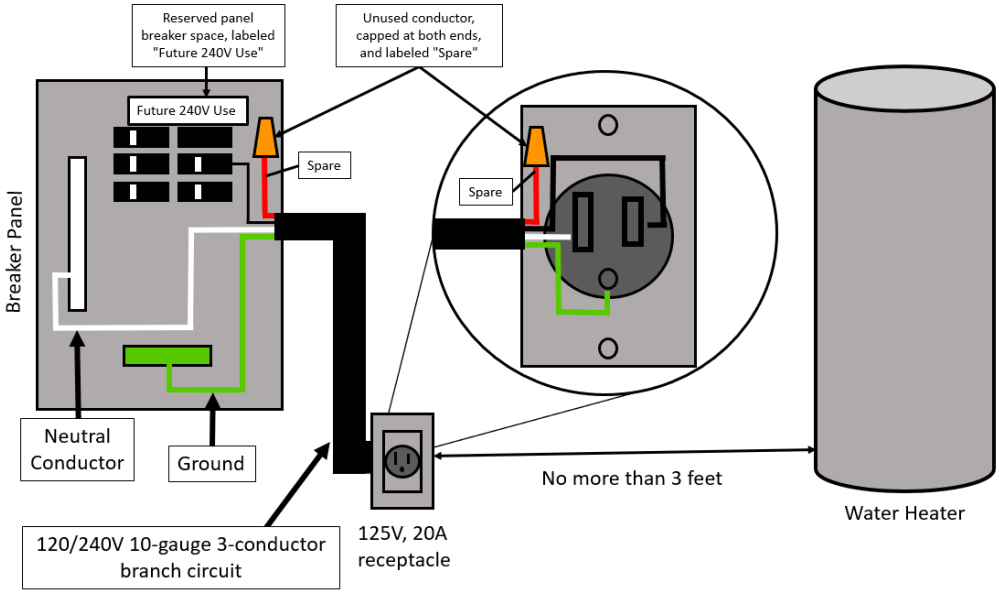

Figure 6: HPWH Ready Connections

Residential Future HPWH Dedicated Receptacle

For future installation of a heat pump water heater (HPWH), Section 150.0(n)1A calls for a 125 volt, 20 amp receptacle, connected to the panel with 10-gauge wire. Could 12-gauge wire be used instead, since it would suffice for 20 amp?

No. The code requires the circuit to be installed in a way that will allow for easy conversion to 240 volt operation. A typical HPWH requires 240 volt at 30 amp, so all conductor wires must be 10-gauge.

Does Section 150.0(n)1Ai specify an unterminated wire to be left in a junction box?

No. The branch circuit in Section 150.0(n)1A will have an unused conductor wire upon installation. Section 150.0(n)1Ai requires that unused conductor wire be labeled "spare," and "electrically isolated," or capped, on both sides (Figure 6).

Does single-phase (residential) power with a 2-pole breaker to supply a 240 volt circuit meet the requirements per Section 150.0(n)1Aii, which specifies a single pole breaker space for the circuit, labeled for "Future 240V Use"?

Yes. Conversion to 240 volt operation requires a 2-pole breaker. The reserved single pole circuit breaker space adjacent to the circuit breaker for the branch circuit is to be labeled with the words "Future 240V Use."

For 2019 Energy Code training online or on-demand see Energy Code Ace's **online offerings** for tools, training, and resources.

Residential Single-Width Headers

Does a single-width header require insulation?

Yes. All exterior window and door headers shall be insulated to a minimum of R-3 for 2x4 framing, or equivalent width, and a minimum of R-5 for all other assemblies. If continuous rigid insulation equal to or greater than R-2 is used across the entire wall, an insulated header is not required.

Are uninsulated single-width headers allowed in a demising wall, such as the wall between the house and garage?

Yes. Walls between garages and conditioned spaces are only subject to mandatory requirements, which do not require continuous rigid insulation.

Residential PV Exception

Is there a PV exception for a home rebuilt after it was destroyed in a declared disaster area (such as a wildfire)?

Yes, if the home was destroyed in a declared disaster before January 1, 2020. **Assembly Bill 178** (AB 178, Dahle, Chapter 259, Statutes of 2019) provides for a PV exception which is available in the latest update to CBECC-Res residential compliance software. Additional information about how to specify this exception can be found in the software and in the CBECC-Res user manual, Section 4.4.1.2. The user manual includes a summary of the income or insurance coverage requirements specified by AB 178. The user manual can be viewed within the CBECC-Res program (select Help, then User Manual) or you can download a copy on the **2019 Approved Computer Compliance web page.** This exception expires on January 1, 2023.

Residential ADUs

I would like to build an accessory dwelling unit (ADU) directly above an existing garage. Is this new ADU considered an addition?

Yes. By adding a second story to the garage, the new ADU is still attached to the garage, and that building's conditioned floor area and conditioned volume are being increased. This is an addition.

I am converting an existing garage under 1,000 square feet to an ADU. Does this new ADU have to meet the 2019 Energy Code indoor air quality whole building ventilation requirements of Section 150.0(o)?

Yes. The 2019 Energy Code now requires whole building ventilation for any new dwelling unit, regardless of size. This requirement applies to both newly constructed ADUs, and to ADUs that are classified as additions.

Does a newly installed kitchen hood require Home Energy Rating System (HERS) verification?

Yes. All kitchen hoods installed in ADUs must have their certification, airflow, and sone rating verified by a HERS rater.

The CEC welcomes feedback on Blueprint. Please contact the editor at: **Title24@energy.ca.gov.**

Residential Non-HERS Compliance Forms

Are residential compliance documents always required to be registered with a HERS provider?

No. However, if HERS verification is required or modeled for compliance credit, then all residential compliance documents must be registered. Examples of residential prescriptive projects that do not require registered compliance documents include:

- Roof surface replacements
- Water heater replacements
- Window replacements
- Non-ducted wall furnace replacements

Dynamic non-HERS residential forms are available for these type of projects.

Do all residential projects require compliance documents?

No. **Section 10-103(a)1C** and **Section 10-103(a)3C** state that enforcement agencies may, at their discretion, choose not to require compliance documents for prescriptive residential alteration projects that do not require HERS verification. Prescriptive additions less than 300 square feet, which do not require HERS verification, may also be exempted from submitting compliance documents.

Residential Duct Testing

Are duct systems exempt from duct testing after asbestos abatement or removal or encapsulation?

No. Exception 3 to **Section 150.2(b)1E** exempts systems from duct testing if existing duct systems are constructed, insulated, or sealed with asbestos. A duct system that has been completely remediated would no longer fall within this exemption. Energy Code regulations do not specify when remediation is effective. The Energy Code defers to the authority having jurisdiction in making this determination.

More information on asbestos may be found in the California State Licensing Board's **asbestos guide for consumers.**

Camp Dwelling Occupancy

Is a dwelling associated with an organized camp under Occupancy Group C required to meet Energy Code?

No. Dwellings classified under group C would be exempt from Title 24, Part 6 requirements. However, occupancy group C is restricted to certain structures or activities associated with an organized camp. Confirm the occupancy group classification of the dwelling with the enforcement agency. All other covered occupancies listed in **Section 100.0(a)** within the organized camp would need to meet the Energy Code requirements.

FOR MORE INFORMATION

Online Resource Center (ORC): www.energy.ca.gov/orc

Home Energy Rating System (HERS): www.energy.ca.gov/HERS

Acceptance Test Technician Certification Provider Program (ATTCP): www.energy.ca.gov/ATTCP

2019 Approved Compliance Software: https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2019-building-energy-efficiency-2

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BLUEPRINT

CALIFORNIA ENERGY COMMISSION

EFFICIENCY DIVISION

IN THIS ISSUE

2019 Energy Code: Focus on Lighting

California's Building Energy Efficiency Standards (Energy Code) have continued to evolve since 1978. Statewide over the past 40 years, the Energy Code has not only helped save energy, but has also saved Californians billions of dollars on their utility bills.

The 2019 Energy Code went into effect on January 1, 2020, and brought some significant changes to residential and nonresidential buildings. For the first time, newly constructed homes are required to utilize a photovoltaic (PV) system to generate renewable energy. Overall, single-family homes will use 53 percent less energy than those built under the 2016 Energy Code, after accounting for more rigorous efficiency measures and renewable energy generation.

Nonresidential buildings will use 30 percent less energy than those built under the 2016 Energy Code. A significant portion of those savings are attributed to changes in the lighting requirements.

Nonresidential Lighting Changes

The biggest change is to the prescriptive indoor and outdoor lighting power allowances. Under the 2016 Energy Code, high performance T8 linear fluorescent lighting was used as the baseline for indoor lighting power density (LPD) calculations. Under the 2019 Energy Code, the baseline is LED lighting. The shift to LED lighting has significantly reduced LPDs. On average, indoor LPDs have been reduced by 28 percent when utilizing the area category method of compliance. This accounts for the single largest energy savings of all changes in the 2019 Energy Code. Because LED lighting is already widely used in the industry, this may not have a substantial effect on the way lighting systems are designed. It will, however, effect the overall energy consumption of these buildings, allowing less energy trade-offs between lighting and other aspects of the building, like the building envelope.

The 2019 Energy Code now regulates healthcare facilities, including hospitals. There is massive potential for energy savings in hospitals due to their continuous operation and high-energy end use intensity. Hospitals must meet lighting power allowance requirements and some of the mandatory lighting control requirements.

For existing buildings, prescriptive lighting alteration compliance pathways have been simplified. Lighting alterations are no longer separated into different categories or types. Indoor lighting alterations are now triggered when 10 percent or more of the luminaires in an enclosed space are altered. The required lighting controls will be dependent on the proposed lighting power. Additionally, the compliance pathway for reducing the existing lighting power continues to be an option, however it is now limited to buildings that are 5,000 square feet or less.

Other changes to the nonresidential lighting requirements include:

Line voltage medium screw-base recessed luminaires can now utilize the rated wattage of the installed screw-base lamp if the lamp is certified per Reference Joint Appendix JA8 (JA8).

Public restrooms are now required to utilize occupancy sensing controls to turn lights off when the restroom is vacant. Multi-level lighting controls are no longer required for public restrooms.

Exceptions to the automatic daylighting control requirements have been added. Sidelit daylit zones with overhangs and skylit daylit zones with external shading may be exempt from automatic daylighting controls when meeting specific criteria. Sidelit daylit zones in retail merchandise sales areas and wholesale showroom areas are now exempt from automatic daylighting controls.

Power adjustment factors for utilizing clerestory fenestration, light shelves, and horizontal slats to increase daylighting for indoor areas have been added.

Automatic scheduling controls are required for outdoor lighting. The scheduling control must be capable of reducing outdoor lighting power by at least 50 to 90 percent during scheduled unoccupied periods.

Residential Lighting Changes

JA8 high efficacy light source requirements remain relatively unchanged, however, products certified under the 2019 Energy Code must be labeled with an updated “JA8-2019” or "JA8-2019-E" marking. Existing products certified under the 2016 Energy Code with either “JA8-2016” or "JA8-2016-E" markings may be used for compliance under the 2019 Energy Code. These products do not need to be retested or relisted in the California Energy Commission (CEC) Modernized Appliance Efficiency Database System (MAEDbS). JA8-2019 certified products may be used for compliance under the 2016 Energy Code.

Other changes to the residential lighting requirements include:

Night lights, step lights, and path lights are not required to be a high efficacy light source or controlled by a vacancy sensor if they are rated at 5 watts or less and emit 150 lumens or less.

Lights internal to drawers, cabinets, and linen closets are not required to be a high efficacy light source or controlled by a vacancy

sensor if they are rated at 5 watts or less, emit 150 lumens or less, and are controlled to automatically turn off when the drawer, cabinet, or linen closet is closed.

Future Energy Codes

The CEC is responsible for adopting, developing, and updating the energy code every three years. Development of the **2022 Energy Code** is already underway with a number of new efficiency measures under evaluation. For lighting, these measures include, but are not limited to: occupancy control in open plan office spaces, daylight dimming-to-off control, reduction of lighting power allowances, and networked lighting controls.

The Energy Code provides an important contribution in helping to achieve ambitious statewide energy efficiency and greenhouse gas (GHG) emission reduction goals. Moving forward, the CEC will continue to work on minimizing the environmental impact of California's buildings by reducing building energy use and GHG emissions through cost effective energy codes.

2019 Energy Code: Central Heat Pump Water Heaters

The CEC's Executive Director has approved specific water heating systems serving multiple dwelling units for compliance with the 2019 Energy Code as meeting the requirements per Section 150.1(c)8C. Central heat pumps provide a pathway to decarbonize water-heating systems for multifamily buildings, while complying with the Energy Code.

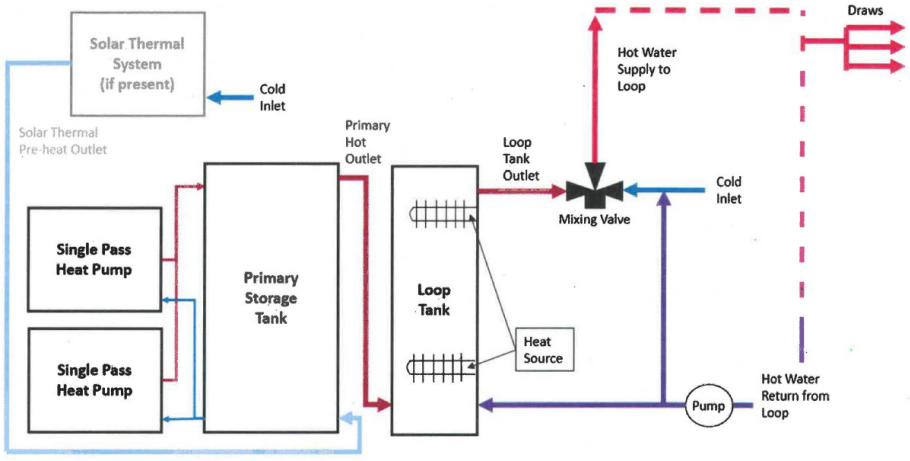
The qualification criteria for these systems varies by climate zone. The criteria may require installing a solar water heating system, or additional PV system capacity per dwelling unit. In climate zone 16 (the coldest California climate zone), additional pipe insulation is also required. See the example system schematic in Figure 1.

The new option allows projects to comply via the prescriptive or performance approach. Download the latest version of **CBECC-Res 2019.1.2 or CBECC-Com 2019.1.2** to model compliance using the performance approach.

A complete list of installation criteria and system requirements is in the **Executive Director Determination letter**.

The CEC welcomes feedback on Blueprint. Please contact the editor at: **Title24@energy.ca.gov.**

Figure 1: Example central heat pump water heater system schematic



Covid-19 Essential Workers

The CEC is available to support essential workers in the construction field. The Energy Standards hotline is responding to emails daily, Monday through Friday. Please leave a voice message to receive a telephone response. In addition, the CEC has determined that **Home Energy Rating System (HERS)** raters and **Acceptance Test Technicians (ATTs)** are considered essential workers. For more information see the **CEC's Advisory notice** and the message from Chair Hochschild on the **CEC's response to Covid-19**.
For Energy Code training online or on-demand see Energy Code Ace's **Training Schedule.**

2019 Energy Code: PV Requirements for ADUs

The 2019 Energy Code PV system prescriptive requirements under Section 150.1(c)14 apply only to newly constructed detached accessory dwelling units (ADUs) for which the permit application was submitted on or after January 1, 2020. Smaller ADUs will require smaller PV systems, or may be exempt from the PV system requirements if they meet Exception 1 to Section 150.1(c)14:

- No PV is required if the effective annual solar access is restricted to less than 80 contiguous square feet by shading from existing permanent natural or man-made barriers external to the dwelling, including but not limited to trees, hills, and adjacent structures. The effective annual solar access shall be 70 percent or greater of the output of an unshaded PV array on an annual basis.

The PV system can be installed on the ADU, or on the main house. In the event that panels are added to an existing PV system to satisfy the PV system requirements for the ADU, those additional panels must be part of the ADU's permit application.

The PV system requirements do not apply to alterations or additions to existing homes, including detached additions where an existing detached building is converted from unconditioned to conditioned space (this is an addition per the Energy Code definitions).

Note: Energy Code requirements, including the PV requirements, do not apply to mobile home ADUs, which are subject to Title 25, not Title 24.

2019 Energy Code: Updated Cool Roof Brochures

The CEC has published two new brochures on the 2019 Energy Code – *Low-rise Residential Cool Roofs* and *Nonresidential, High-rise Residential, Hotel and Motel Cool Roofs*. These brochures are available for download from the **Online Resource Center Envelope** web page.

These brochures include information on the following requirements for cool roofs:

- Solar reflectance and thermal emittance
- Solar reflectance index
- Mandatory labeling requirements
- Prescriptive requirements
- Code triggers for roof alterations
- Exceptions to the requirements

ENERGY STANDARDS HOTLINE

Available to help with Energy Standards (Title 24, Part 6) questions.

EMAIL
title24@energy.ca.gov

CALL
800-772-3300
Toll free in CA

916-654-5106
Outside CA

HOURS
8 a.m.–12 p.m. and 1 p.m.–4:30 p.m.

2019 Energy Code: Approved Lighting ATTCPs

Lighting controls acceptance test technician certification provider (ATTCP) training has been approved for the 2019 Energy Code. The CEC has approved the lighting controls ATTCP application updates for the 2019 Energy Code from both the California Advanced Lighting Controls Training Program (CALCTP) and the National Lighting Contractors Association of America (NLCAA). CALCTP and NLCAA can train, certify, and recertify lighting controls acceptance test technicians and their employers under the 2019 Energy Code. For more information, visit the **ATTCP web page**.

Q&A

Calculation of Allowed Indoor Lighting Power

Are retail store buildings permitted to use the Complete Building Method lighting power density values listed in Table 140.6-B?

Yes. Retail stores were added to Table 140.6-B in the 2019 Energy Code.

Is the parenthetical language correct in Section 140.6(c)1A that seems to suggest retail stores cannot use Table 140.6-B?

No. The parenthetical example in Section 140.6(c)1A is incorrect. Retail store buildings are permitted to use the Complete Building Method for the 2019 Energy Code. Fortunately, parenthetical language does not have legal effect, and the CEC has added this errata to the list of corrections for the **2022 Energy Code** update.

Outdoor Solar Powered Lighting

Are self-contained solar powered portable path luminaires subject to the requirements of the Energy Code?

No. If a permit is not required for the installation of this lighting, then it is exempt from the Energy Code. The CEC does not anticipate that this lighting would require a permit, but please confirm with the enforcement agency.

Are self-contained solar powered pole-mounted luminaires subject to the requirements of the California Energy Code?

Yes. If a permit is required for the installation of this lighting, then it must comply with Energy Code. The CEC anticipates that this lighting would require a permit given that it is a permanent improvement, but please confirm with the enforcement agency.

Note: Temporary outdoor lighting is exempt from Section 140.7(a) and the control requirements of Section 130.2(c)3.

FOR MORE INFORMATION

Online Resource Center (ORC): www.energy.ca.gov/orc

Home Energy Rating System (HERS): www.energy.ca.gov/HERS

Acceptance Test Technician Certification Provider Program (ATTCP): www.energy.ca.gov/ATTCP

2019 Approved Compliance Software: www.energy.ca.gov/title24/2019standards/2019_computer_prog_list.html

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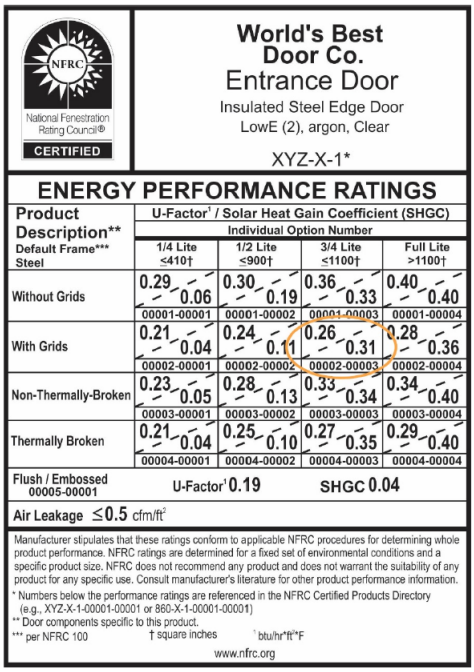
IN THIS ISSUE

2019 ENERGY CODE: NRFC RATED EXTERIOR DOORS

The California Energy Commission's (CEC) *2019 Building Energy Efficiency Standards* (Energy Code) requires non-field fabricated exterior doors to meet U-factor and labeling requirements for all buildings. This includes opaque doors, defined as having less than 25 percent glazing material.

Exterior doors' labeled efficiency values must either use a National Fenestration Rating Council (NFRC) rating or use the default values listed in **Reference Joint Appendix JA4.5**. The default values are intentionally conservative and will not meet low-rise residential prescriptive requirements. Note: Doors with 25 percent or greater glazing are treated as fenestration.



NFRC National Fenestration Rating Council® CERTIFIED

World's Best Door Co.
Entrance Door
Insulated Steel Edge Door
LowE (2), argon, Clear
XYZ-X-1*

ENERGY PERFORMANCE RATINGS

Product Description** Default Frame*** Steel	U-Factor† / Solar Heat Gain Coefficient (SHGC) Individual Option Number			
	1/4 Lite ≤410†	1/2 Lite ≤900†	3/4 Lite ≤1100†	Full Lite >1100†
Without Grids	0.29 / 0.06 00001-00001	0.30 / 0.19 00001-00002	0.36 / 0.33 00001-00003	0.40 / 0.40 00001-00004
With Grids	0.21 / 0.04 00002-00001	0.24 / 0.11 00002-00002	0.26 / 0.31 00002-00003	0.28 / 0.36 00002-00004
Non-Thermally-Broken	0.23 / 0.05 00003-00001	0.28 / 0.13 00003-00002	0.33 / 0.34 00003-00003	0.34 / 0.40 00003-00004
Thermally Broken	0.21 / 0.04 00004-00001	0.25 / 0.10 00004-00002	0.27 / 0.35 00004-00003	0.29 / 0.40 00004-00004
Flush / Embossed 00005-00001	U-Factor† 0.19		SHGC 0.04	
Air Leakage ≤0.5 cfm/ft²				

Manufacturer stipulates that these ratings conform to applicable NFRC procedures for determining whole product performance. NFRC ratings are determined for a fixed set of environmental conditions and a specific product size. NFRC does not recommend any product and does not warrant the suitability of any product for any specific use. Consult manufacturer's literature for other product performance information.

* Numbers below the performance ratings are referenced in the NFRC Certified Products Directory (e.g., XYZ-X-1-00001-00001 or 860-X-1-00001-00001)
** Door components specific to this product.
*** per NFRC 100 † square inches ‡ btu/hr*ft²*F

www.nfrc.org

NFRC Door Label

2019 ENERGY CODE: COMPLIANCE SOFTWARE

The CEC has approved several compliance software programs for the 2019 Energy Code. The list of approved software versions and their corresponding approval and expiration dates is available on the **2019 compliance software** web page. Check back often for approved version updates.

For residential buildings, the following programs are approved:

- CBECC-Res 2019.1.0
- EnergyPro 8.0

For nonresidential buildings, the following programs are approved:

- CBECC-Com 2019.1.0
- EnergyPro 8.0

2019 ENERGY CODE: HERS PROVIDERS

The CEC has approved CalCERTS and CHEERS as Home Energy Rating System (HERS) providers for the 2019 Energy Code. The purpose of the HERS program is to inspect, test, and rate the installation of energy efficient measures in buildings. HERS providers are approved based upon several factors, including their ability to:

- Train and certify HERS raters.
- Create and maintain a registry and database.
- Provide ongoing access to their registry and database for CEC staff.
- Create a quality assurance program and conduct quality assurance inspections on their HERS raters' work.
- Report annually to the CEC as required per Title 20.

CalCERTS is approved for:

- Field verification for newly constructed, additions, and alterations of residential and nonresidential buildings.
- California whole-house home energy ratings.
- HERS building performance contractors.

CHEERS is approved for:

- Field verification for newly constructed, additions, and alterations of residential and nonresidential buildings.

For more information, please visit the **HERS program** web page (shown below).

Need Training?

Request 2019 Energy Code training from CEC's Building Standards Outreach and Education staff by emailing **Title24@energy.ca.gov.**

For Energy Code training in-person, online, or on-demand see Energy Code Ace's **Training Schedule.**

HERS Program web page

PROCESS SPACE

The difference between process space and covered processes needs to be understood to apply the Energy Code requirements properly. A process space is a space that is controlled to maintain temperatures below 55 degrees Fahrenheit or above 90 degrees Fahrenheit. Spaces that are maintained within the temperature range of 55 degrees Fahrenheit to 90 degrees Fahrenheit are considered conditioned spaces. There are 10 covered processes with specific efficiency requirements in **Energy Code Sections 120.6** and **140.9**.

In both the 2016 Energy Code and the 2019 Energy Code, the mandatory requirements for space conditioning equipment in **Section 110.2** do not apply to equipment used solely for process spaces.

Section 100.0(b) describes the parts of buildings regulated by the Energy Code in the buildings covered under the occupancy groups listed in Section 100.0(a) and as set forth in Table 100.0-A. Table 100.0-A lists the requirements in Section 110.2 for HVAC systems in conditioned spaces and for covered processes, but it does not cover the requirements for HVAC systems in process spaces.

Therefore, equipment used for covered processes must meet the requirements in Section 110.2, except where the equipment meets specific exceptions in the Energy Code or has specific efficiency requirements stated in Sections 120.6 or 140.9. If the equipment serves both conditioned and process spaces, the equipment must meet the requirements in Section 110.2. Equipment used solely for process spaces, and not for covered processes, does not need to meet the requirements in Section 110.2.

Q&A

Daylighting Controls and Opaque Curtain Walls

Are automatic daylighting controls required for daylit zones adjacent to opaque glazing in curtain walls per Section 130.1(d) and 140.6(d)?

No. The automatic daylighting control requirements do not apply to daylit zones adjacent to opaque curtain walls. The Energy Code defines sidelit daylit zones as the areas in plan view directly adjacent to each vertical glazing. Glazing is a fenestration product that is defined as being transparent or translucent. Note: Automatic daylighting control requirements will apply to daylit zones adjacent to transparent or translucent curtain walls.

Building Commissioning

Do the commissioning requirements apply to nonresidential areas in high-rise residential buildings?

Yes. The commissioning requirements in **Section 120.8** apply to all nonresidential building occupancies groups. For a mixed-use building, any space or area that is not classified as a residential building occupancy (R) is subject to commissioning, when it is classified as one of these building occupancy groups groups: A, B, E, F, H, M, S, and U.

The CEC welcomes feedback on Blueprint. Please contact the editor at: **Title24@energy.ca.gov**

HVAC Occupancy Sensor Zone Control Requirements

Are both occupancy sensor ventilation control (OSVC) and occupancy sensors zone control (OSZC) required to control ventilation and space conditioning systems as described in Sections 120.1(d)5 and 120.2(e)3?

Yes, when both of the following conditions exist:

- Occupant sensors are required for lighting controls per **Section 130.1(c)5, 6, or 7.**
- All occupancy categories in the zone have Note F in **Table 120.1-A** allowing the ventilation to be reduced to zero when the space is in occupied-standby mode.

Can ventilation to a zone be reduced to zero if an occupancy sensor is used when it is not required?

Yes. If an occupancy sensor is used when it is NOT required by Sections 130.1(c)5, 6, or 7, the airflow to the zone can be reduced to zero as described in Section 120.2(e)3. However, all occupancy categories in the zone must have Note F in Table 120.1-A allowing ventilation to be reduced to zero when in occupied-standby mode.

Are OSVC and OSZC still required for HVAC systems in a multi-occupancy category zone if one or more of the occupancy categories do not have a Note F in Table 120.1-A, but occupancy sensors are required by Sections 130.1(c)5, 6, or 7?

No. In this case occupancy sensors are not required for ventilation or space conditioning controls as described in Sections 120.1(d)5 and 120.2(e)3, and ventilation must be supplied at all times during scheduled occupancy. All occupancy categories in a zone must have Note F in Table 120.1-A to allow the ventilation to be reduced to zero when the zone is in occupied-standby mode. Note: Occupancy sensors are still required for lighting control.

Can one of either OSVC in Section 120.1(d)5 or OSZC in Section 120.2(e)3 be required and not the other?

No. Sections 120.1(d)5 or §120.2(e)3 are tied together. Either all of Section 120.1(d)5 and all of Section 120.2(e)3 are required, or neither is required.

Is an occupancy sensor required in each room of a zone?

Yes. Whenever using occupancy sensors for ventilation control, whether required or not, all rooms within the zone must have an occupancy sensor and the zone is not considered vacant until all rooms in the zone are vacant. See **Section 120.2(e)3** for exceptions.

Lighting Power Exceptions and Control Requirements

For indoor lighting, if lighting is excluded from the indoor power limitations per Section 140.6(a)3, is that lighting also excluded from the indoor lighting control requirements of Section 130.1?

No. Indoor lighting excluded from the power limitations of **Section 140.6** is not necessarily exempt from the mandatory control requirements of **Section 130.1**. These sections are independent of each other.

For outdoor lighting, if lighting is excluded from the outdoor power limitations per the exceptions to Section 140.7(a), is that lighting also excluded from the outdoor lighting control requirements of Section 130.2?

No. The only outdoor lighting control exception that aligns with the outdoor power exceptions is Exception 2 to **Section 130.2(c)3.** This means that if the lighting in question is exempt from the power limitations, it is also exempt from the motion sensing control requirements of 130.2(c)3. All other sections still apply.

Occupant Controlled Smart Thermostats

Can a thermostat with a cloud-based demand response feature qualify as an occupant controlled smart thermostat (OCST) under the 2019 Energy Code?

Yes. Thermostats with cloud-based demand response features can be listed as an OCST if the they are capable of responding automatically to signals and implementing control functions requested by a cloud-based OpenADR 2.0b Virtual End Node (VEN). The manufacturer must certify to the CEC that the OCST has this capability. Reference Joint Appendix JA5 (JA5) contains requirements for OCST certification to the CEC. Declaration forms can be found on the **Manufacturer Certification of Building Equipment** web page.

Are devices listed under the CEC's 2016 List of OCSTs automatically included on the CEC's 2019 List of OCSTs?

No. Manufacturers must recertify their products to the CEC to be placed on the eligible 2019 List of OCSTs.

Do devices listed under the CEC's 2016 List of OCSTs require any changes to qualify for the CEC's 2019 List of OCSTs?

No, provided the devices are a certified OpenADR 2.0a or 2.0b VEN. An OCST that complies with the 2016 JA5 requirements by including a certified OpenADR 2.0a or 2.0b VEN will also meet the CEC's 2019 JA5 requirements.

Can an OCST with a cloud-based demand response feature meet the qualifications of CEC's 2019 JA5 if it is only capable of responding to the OpenADR 2.0a set of commands?

No. OpenADR 2.0a is designed to be a reduced set of behaviors appropriate for the limited computing power available in an on-site device. These limits do not apply to cloud computing, and thus OpenADR 2.0b is required for devices that use the cloud to provide demand response. If the OpenADR VEN is physically located in the OCST (not in the cloud), then OpenADR 2.0a is sufficient.

FOR MORE INFORMATION

Online Resource Center (ORC):
www.energy.ca.gov/orc

Home Energy Rating System (HERS):
www.energy.ca.gov/HERS

Acceptance Test Technician Certification Provider Program (ATTCP):
www.energy.ca.gov/ATTCP

2016 Approved Compliance Software:
www.energy.ca.gov/title24/2016standards/2016_computer_prog_list.html

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IN THIS ISSUE

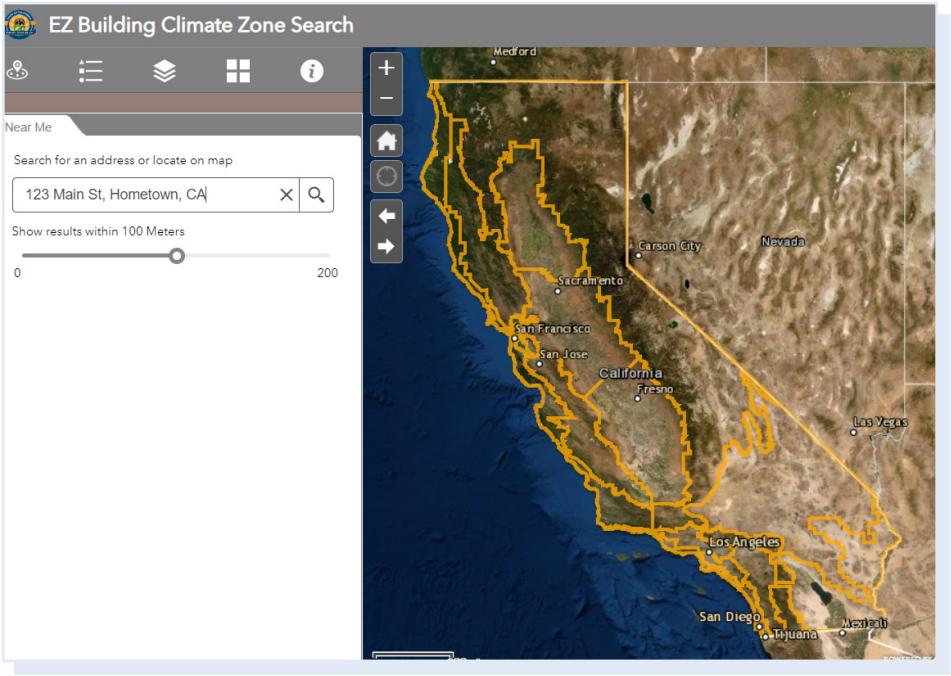
2019 ENERGY CODE: NEW CLIMATE ZONE SEARCH TOOL

The California Energy Commission (CEC) has developed the EZ Building Climate Zone Search tool to quickly and accurately show addresses and locations in relation to the geographic meets and bounds that determine California's climate regions.

In addition to showing climate zone boundaries, the search tool is a multi-layer interactive map which allows users to add zip code and county boundaries.

A building project's climate zone is based on its physical location as it relates to the survey definitions of the 16 climate regions found in the CEC publication **California Climate Zone Descriptions**.

The search tool can be used as an alternative to the climate zones by zip code listing. The CEC invites builders and building officials to use the search tool to determine the climate zones applicable to building projects in their area. The search tool and instructions can be found on the **2019 Building Energy Efficiency Standards** webpage under the compliance form section.



2019 EZ Building Climate Zone Search Tool

2019 ENERGY CODE: WHOLE HOUSE FAN COMPLIANCE FOR LOW-RISE RESIDENTIAL

For the 2019 Building Energy Efficiency Standards (Energy Code), the prescriptive requirement in **Section 150.1(c)12** for whole house fan (WHF) airflow is 1.5 cubic feet per minute (CFM) of airflow for each square foot of conditioned floor area. The 2019 performance approach standard design WHF fan efficacy changed from 0.10 to 0.14 watts per CFM. Installing a more efficient whole house fan will reduce building energy use and may improve compliance credit when using the performance approach. To determine compliance, the modeling software compares the proposed WHF energy use to the standard design which is based on the prescriptive standards as described in the 2019 Residential Alternative Calculation Method (ACM) Reference Manual.

When utilizing performance approach, WHFs must meet the prescriptive requirements for attic ventilation of at least one square foot of attic vent free area for each 750 CFM of rated WHF airflow (or greater vent area if specified by manufacturer) and provide homeowners with a one page "How to Operate Your Whole House Fan" informational sheet. The 2019 CBECC-Res software has a new option to specify WHFs exhausted directly outdoors rather than into the attic, such as installed in a cathedral ceiling or ducted directly to the outdoors; these WHFs are exempt from the attic vent free area requirements.

Additionally, WHFs must be listed in the Modernized Appliance Efficiency Database System (MAEDbS) with values that meet or exceed the prescriptive requirements. The performance approach has the same requirements for default WHFs. For a specified WHF using the performance approach, the airflow and efficacy values modeled by the software and listed on the certificate of compliance do not need to match the MAEDbS values; however these WHFs must be Home Energy Rating System (HERS) verified to receive compliance credit. The 2019 Energy Code requires HERS verification for all WHFs other than a default WHF. HERS verification is optional for default WHFs and when selected CBECC-Res simulates additional WHF airflow which may increase compliance credit.

For more information, see the **Residential ACM Reference Manual**. For more information on whole house fan compliance for the 2016 Energy Code, see **Blueprint Issue 125**.

2019 ENERGY CODE: MASTER PLAN PERMIT APPLICATIONS

When builders submit permit applications to an enforcement agency for new residential subdivisions, often there are multiple model homes or master plan designs to which all homes in the project will be built. CF1Rs are submitted with the permit application to demonstrate compliance with the Energy Code.

When registered CF1Rs for new residential subdivisions are submitted to and approved by the enforcement agency, builders can continue to pull permits for all houses in the subdivision under the approved master plan design using the approved CF1Rs, provided the approved master plan designs have not been changed.

If one or more of the master plan designs have changed, the affected homes will require new CF1Rs with the new permit application. CF1Rs must be generated using a version of the computer compliance software approved for the new permit application date. New CF1Rs are only required for plans that are changed.

2019 ENERGY CODE: LOW-RISE RESIDENTIAL EARLY ADOPTERS

Builders who would like to demonstrate compliance for low-rise residential buildings according to the 2019 Energy Code before the January 1, 2020, effective date may do so at the enforcement agency's discretion. Enforcement agencies allowing early adoption should:

- Accept, review, and approve plans and unregistered CF1Rs until a HERS Provider is approved for the 2019 Energy Code by the CEC.
- Ensure that the residential computer compliance software used is approved by the CEC for demonstrating compliance with the 2019 Energy Code.
- Confirm that CF1Rs are registered before a permit is finaled or a Certificate of Occupancy is issued.

NOTE: All compliance documents for a project must be registered, as required, once a HERS provider data registry is approved for the 2019 Energy Code.

Q&A

PV Calculations for Multifamily

When calculating the required photovoltaic (PV) size for multifamily in the 2019 Energy Code using Equation 150.1-C, is the building's common area included in the conditioned floor area?

No. The conditioned floor area should only include the square footage of the dwelling units and should not include the common areas.

Integrated PV Roof Replacements

When doing a full roof replacement on a steep slope roof in climate zone 12 with new integrated photovoltaic roofing product, does the roofing product need comply with the Energy Code requirements in Section 150.2(b)1?

Yes. The roofing product must comply with the Energy Code and be rated by the Cool Roof Rating Council. Only the active photovoltaic area of the roof is exempt from these requirements.

Lighting on Private Streets

Does street lighting inside a gated community have to meet any lighting requirements?

Yes. Lighting of private streets must meet the nonresidential outdoor lighting requirements.

Are there any exceptions to the lighting requirements in Section 140.7(a) for private streets?

No. There are no exceptions to Section 140.7(a) for private streets. The lights must meet all applicable sections of the nonresidential lighting requirements (the third exception is specific to public streets).

Radiant Barriers

In an attic where a radiant barrier is being installed to meet Energy Code requirements, does the wall that separates the attic over the garage from the attic over the conditioned area need to have a radiant barrier?

No. Only vertical surfaces that are exterior walls need to have a radiant barrier.

Modeling ADU plus Addition

When modeling a conversion of an existing garage to an accessory dwelling unit (ADU), and also making an addition to the existing house, can this be modeled together using the existing plus addition plus alteration approach?

Yes. In this scenario, the existing home, addition, and ADU must be modeled as separate zones. Also, if the existing home has natural gas connected to it, the project must be modeled with natural gas being available.

The CEC welcomes feedback on Blueprint. Please contact the editor at: **Title24@energy.ca.gov**

FOR MORE INFORMATION

Online Resource Center (ORC):
https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/online-resource-center

Home Energy Rating System (HERS):
https://www.energy.ca.gov/programs-and-topics/programs/home-energy-rating-system-hers-program

Acceptance Test Technician Certification Provider Program (ATTCP):
https://www.energy.ca.gov/programs-and-topics/programs/acceptance-test-technician-certification-provider-program

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IN THIS ISSUE

2019 ENERGY CODE: LOW-RISE RESIDENTIAL SUMMARY OF MAJOR CHANGES

The most significant change in the 2019 Building Energy Efficiency Standards (Energy Code) for low-rise residential buildings is the introduction of photovoltaic (PV) requirements in the prescriptive standards. There are also significant changes related to the indoor air quality requirements. This is a summary of these and other major changes:

Mandatory Measures

1. Walls with 2x6 framing require R-20 minimum insulation for wood-framed; or 0.071 maximum U-factor. **§ 150.0(c)2**

2. Modifications to the indoor air quality requirements of American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 62.2 are included for various building and dwelling unit configurations such as horizontally attached buildings, or central ventilation systems. Balanced or continuously operating supply or exhaust ventilation system required. Home Energy Rating System (HERS) verification required when kitchen range hoods are installed. **§ 150.0(o)**

3. Minimum efficiency reporting value (MERV) 13 air filters (or equivalent) are required for heating, cooling, and on the supply side of ventilation systems. **§ 150.0(m)12**

4. Fan efficacy requirements are 0.45 watts/cubic feet per minute (CFM) or less for gas furnace air-handling units; or 0.58 watts/CFM or less for air-handling units that are not gas furnaces. New fan efficacy requirement for small-duct high-velocity forced-air systems. **§ 150.0(m)13B, C, D**

Prescriptive Compliance

1. New PV solar electric generation requirement. **§ 150.1(c)14**

2. New prescriptive **Table 150.1-B** for multifamily buildings. **§ 150.1(c)**

3. Wall U-factors in climate zones 1-5 and 8-16 reduced to 0.048 maximum in single-family buildings; climate zones 6-7 remain at 0.065 maximum. **§ 150.1(c)1B**

4. New exterior door U-factor 0.20 maximum and National Fenestration Rating Council (NFRC) labeling requirements. **§ 150.1(c)5, § 110.6(a)5**

5. Quality insulation installation (QII) for all single-family buildings in all climate zones, and multifamily buildings in all climate zones except climate zone 7. HERS verification required. **§ 150.1(c)1E**

6. New prescriptive options for heat pump water heaters for newly constructed buildings, additions, and alterations. **§ 150.1(c)8**, **§ 150.2(a)1D**, **§ 150.2(b)1H**

Performance Compliance

Compliance for newly constructed buildings is now based on a proposed energy design rating (EDR) index, where a score of 100 represents a 2006 International Energy Conservation Code compliant building, and a score of zero represents a building that has zero net energy consumption based on the time-dependent valuation (TDV) energy consumption. The total EDR is calculated using approved compliance software as specified by the 2019 Alternative Calculation Method Approval Manual and includes an energy efficiency EDR, a solar electric generation and demand flexibility EDR, and the total EDR. **§ 150.1(b)1**, **§ 110.1**

Additions and Alterations

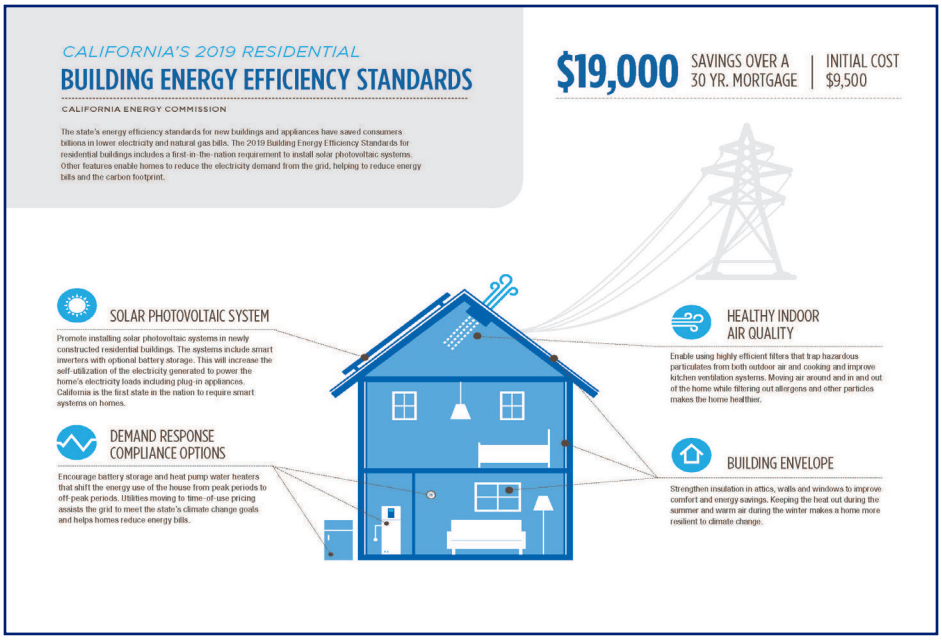
1. Changed the prescriptive requirement for continuous insulation on existing walls with wood siding; if siding is not removed, only cavity insulation is required. **§ 150.2(a)1**

2. QII is not required for additions that are 700 square feet or less. **§ 150.2(a)1B**

3. Roof and ceiling insulation for prescriptive additions of 700 square feet or less require R-38 minimum in climate zones 1, 11-16; or R-30 minimum in climate zones 2-10. A radiant barrier is required in climate zones 2-15. **§ 150.2(a)1B**

4. Natural gas is available for newly constructed buildings if a gas service line can be connected to the site without a gas main extension. For additions, natural gas is available if a gas service line is connected to the existing building. **§ 100.1**

The 2019 Energy Code *What's New for Residential* summary and infographic are both available **here.**



2019 Residential Infographic

2019 ENERGY CODE: NONRESIDENTIAL, HOTEL AND MOTEL, HIGH-RISE RESIDENTIAL SUMMARY OF MAJOR CHANGES

The most significant changes in the 2019 Energy Code for nonresidential, hotel and motel, and high-rise residential buildings are in lighting design. These and other changes include:

Lighting

1. Revised and streamlined luminaire classification and wattage requirements. **§ 130.0(c)**

2. Clarified and streamlined manual area controls, multi-level lighting controls, and automatic daylighting controls requirements. Restrooms to comply with occupancy sensor control requirements. New section for indoor lighting control interactions. **§ 130.1**

3. Changed indoor and outdoor lighting power allowances based on LED lighting technologies. Revised lighting power density values in **Tables 140.6-B to 140.6-G**, and **Table 140.7-B**. **§ 140.6**, **§ 140.7**

4. New prescriptive requirements and power adjustment factors for daylighting devices including horizontal slats, light shelves and clerestory fenestrations. **§ 140.3(d)**, **§ 140.6(a)2L**

5. New lighting power adjustment for small aperture tunable-white and dim-to-warm LED luminaires. **§ 140.6(a)4B**

6. Revised and streamlined outdoor lighting controls requirements. **§ 130.2(c)**

7. New separate lighting power allowance values for concrete-surfaced and asphalt-surfaced hardscape outdoor lighting application in **Table 140.7-A**. **§ 140.7**

8. Revised and streamlined alteration requirements. Merged three sections into one altered indoor lighting systems section. Aligned two reduced power options on controls, and alterations using power reduction limited to 5,000 square feet. Revised and consolidated **Table 141.0-F**. **§ 141.0(b)2I**

Mechanical

1. MERV 13 air filters (or equivalent) are required for heating and cooling systems. Filtration requirements extended to supply-only ventilation systems and the supply side of balanced ventilation systems. **§ 120.1(b), (c)**

2. New ventilation requirements for high-rise residential dwelling units, now aligned with ASHRAE 62.2. Must be a balanced system or a continuously operating supply or exhaust system. HERS blower door test required for continuously operating ventilation systems. **§ 120.1(b)**

3. Kitchen range hoods in high-rise residential dwelling units require HERS verification and acceptance testing to ensure Home Ventilating Institute certification complies with ASHRAE 62.2 minimum airflow and sound rating requirements. **§ 120.1(b)**

4. Incorporated natural and exhaust ventilation procedures of ASHRAE 62.1. Updated **Table 120.1-A** to include minimum ventilation rate for more spaces. **Table 120.1-B** added for minimum exhaust rate for certain spaces. **§ 120.1**

5. Expanded economizer fault detection and diagnostics requirements to all cooling systems over 54,000 Btuh with an air economizer. **§ 120.2(i)**

Envelope

1. Exception for the site-built fenestration default calculations reduced from 1,000 square feet to 200 square feet. **§ 110.6**

2. Exterior doors now included in NFRC rating and labeling requirements. **§ 110.6**

Covered Processes

1. New fan efficiency and automatic sash closure requirements, includes acceptance testing, for laboratory fume hoods. **§ 140.9(c)1, 4**

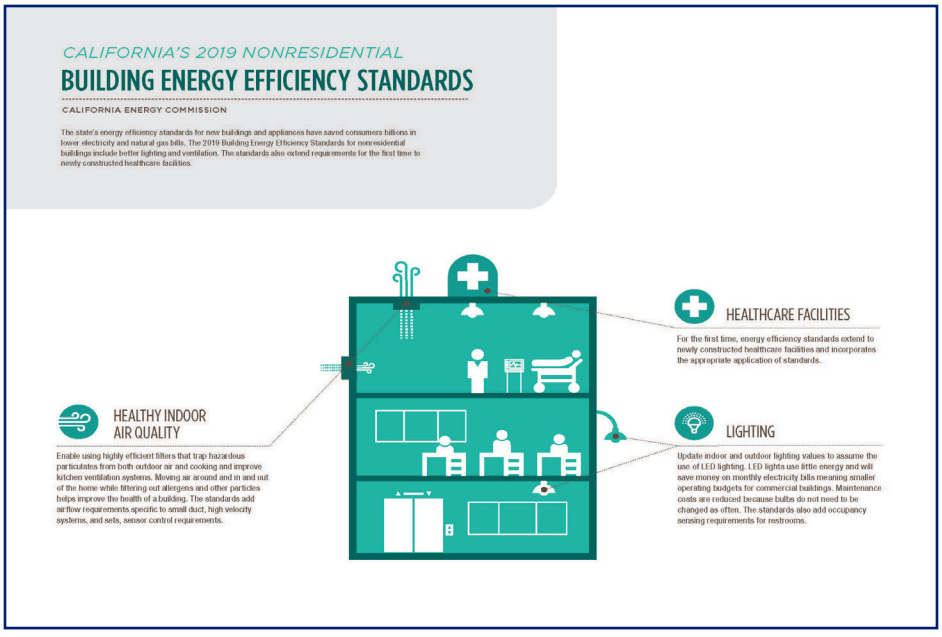
2. New efficiency and system control requirements for adiabatic condensers serving refrigerated warehouses and supermarkets. **§ 120.6(b)**

Healthcare Facilities

Healthcare facilities overseen by the California Office of Statewide Health Planning and Development are now included in the scope of Energy Code. Exceptions are incorporated to ensure appropriate application.

The 2019 Energy Code *What's New for Nonresidential* summary and infographic are both available **here.**

2019 Nonresidential Infographic



2019 ENERGY CODE: CBECC SOFTWARE AND ACM MANUALS APPROVED

The Energy Commission has approved the 2019 public domain CBECC-Res residential and CBECC-Com nonresidential software used to demonstrate performance compliance with the 2019 Energy Code. Also approved are the 2019 Residential and Nonresidential Alternative Calculation Method (ACM) Reference Manuals as required by Public Resources Code Section 25402.1(e). The ACM Reference Manuals document the modeling methods used in the 2019 CBECC Compliance Software.

CBECC software is a free computer program developed by the Energy Commission. This software is used to demonstrate compliance with the Energy Code. CBECC software is an open source software. This makes all of the source code of one of the world's most advanced building modeling software programs available to the public at no cost. Other entities can alter the source code to help meet their energy efficiency goals.

The list of approved software versions and their corresponding approval and expiration dates is available **here**.

The 2019 Residential ACM Reference Manual is available **here**.

The 2019 Nonresidential ACM Reference Manual is available **here**.

ENERGY STANDARDS

HOTLINE

Available to help with Energy Standards (Title 24, Part 6) questions.

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title24@energy.ca.gov

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800-772-3300
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916-654-5106
Outside CA

HOURS

8 a.m.–12 p.m. and
1 p.m.–4:30 p.m.

2016 ENERGY CODE: NEW FACT SHEETS AND VIDEOS FOR COVERED PROCESSES

New educational fact sheets and videos are now available on the Online Resource Center (ORC). The fact sheets and videos provide an overview of the 2016 Energy Code mandatory and prescriptive requirements for covered processes in nonresidential, high-rise residential, hotel and motel buildings. To view the new fact sheets and videos, please visit the **ORC.**

Fact Sheets: Covered Processes

- Quick Reference Guide
- Refrigerated Warehouses
- Commercial Refrigeration
- Enclosed Parking Garages
- Process Boilers
- Compressed Air Systems
- Elevators
- Escalators and Moving Walkways
- Computer Rooms
- Commercial Kitchens
- Laboratory Exhaust Systems

Videos: Mandatory and Prescriptive Requirements for Covered Processes

- Course 3A: Mandatory Requirements for Refrigerated Warehouses
- Course 3B: Mandatory Requirements for Commercial Refrigeration
- Course 3C: Mandatory Requirements for Enclosed Parking Garages
- Course 3D: Mandatory Requirements for Process Boilers
- Course 3E: Mandatory Requirements for Compressed Air Systems
- Course 3FG: Mandatory Requirements for Elevators, Escalators, and Moving Walkways
- Course 3H: Prescriptive Requirements for Computer Rooms
- Course 3I: Prescriptive Requirements for Commercial Kitchens
- Course 3J: Prescriptive Requirements for Laboratory Exhaust Systems

Covered Processes *Quick Reference Guide*
2016 Title 24 Building Energy Efficiency Standards | Efficiency Division

COVERED PROCESS	STANDARDS SECTION	ACCEPTANCE TESTING	COVERED EQUIPMENT/ REQUIREMENTS*	APPLICABILITY*
Refrigerated Warehouses	120.6(a)	Yes	Envelope, underslab heating, evaporators, compressors, infiltration barriers	Refrigerated spaces ≥ 3,000 ft², or spaces added together ≥ 3,000 ft2 on the same refrigeration system
Commercial Refrigeration	120.6(b)	No	Refrigerated cases: condensers, compressors, display case lighting, heat recovery	Retail food stores with conditioned floor space ≥ 8,000 ft²
Enclosed Parking Garages	120.6(c)	Yes	Exhaust and ventilation fan controls; CO sensor location, certification, and monitoring	Enclosed parking garages with exhaust rate ≥ 10,000 cfm
Process Boilers	120.6(d)	No	Combustion air shut-off, fan motors, exhaust stack oxygen concentration level limits	Process boilers with input ≥ 2.5 MMBtu/hr, or with combustion air fan motors ≥ 10 hp
Compressed Air Systems	120.6(e)	Yes	Trim compressors, minimum primary storage, compressor controls	Compressed air systems with online compressor(s) horsepower ≥ 25 hp
Elevators	120.6(f)	Yes	Lighting power density, ventilation fan efficiency, automatic shut-off controls	All new and altered elevators
Escalators and Moving Walkways	120.6(g)	Yes	Maximum speed and acceleration, automatic speed reduction, passenger detection	New and altered escalators and moving walkways located in airports, hotel, and transportation function areas
Computer Rooms (Data Centers)	140.9(a)	No	Economizers, reheat, humidification, fan power and controls, containment	Computer rooms and data centers with a power density > 20 watts/ft²
Commercial Kitchens	140.9(b)	Yes	Exhaust hood airflow rate, makeup and transfer air, exhaust and ventilation controls	New and altered commercial kitchens with exhaust hoods
Laboratory Exhaust Systems	140.9(c)	No	Controls coordinating exhaust and makeup air to maintain room pressure and/or air changes	Laboratory exhaust systems requiring ≤ 10 air changes per hour

* Exceptions may apply. See listed Energy Efficiency Standards section(s) for details.

2016 Covered Processes Quick Reference Guide

Q&A

Outdoor Electric Heating

Does the Energy Code regulate outdoor electric heating?

No. The Energy Code does not regulate outdoor heating, whether electric, or any other fuel type. Space conditioning systems regulated by the Energy Code, are defined as being associated with conditioned spaces inside a building.

Flag Pole Lighting

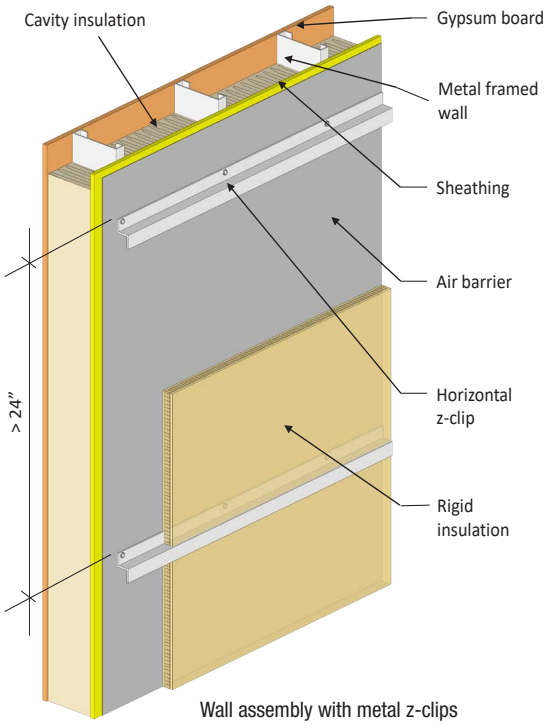
Is the lighting power for a flagpole exempt from the 2016 Energy Code?

Yes. Lighting for a flagpole is considered lighting for a public monument. As described in the exceptions to **§ 140.7(a)**, lighting power for public monuments is exempt from § 140.7 of the 2016 Energy Code. Note that while the power is exempt, this lighting is still subject to the applicable control requirements of **§ 130.2(a)**, **§ 130.2(c)1 and § 130.2(c)2** of the 2016 Energy Code.

Continuous Insulation and Z-Clips

Is a metal z-clip considered a break in the continuous insulation when continuous rigid insulation is installed on horizontal 16-gauge z-clips, spaced 16" on center?

Yes. For z-clip horizontal or vertical spacing up to 24", use the values found in the 2016 Joint Reference Appendix **JA4, Table 4.3.14**. For spacing greater than 24", the z-clip is considered a fastener.



Wall assembly with metal z-clips

FOR MORE INFORMATION

Online Resource Center (ORC):
https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/online-resource-center

Home Energy Rating System (HERS):
https://www.energy.ca.gov/programs-and-topics/programs/home-energy-rating-system-hers-program

Acceptance Test Technician Certification Provider Program (ATTCP):
https://www.energy.ca.gov/programs-and-topics/programs/acceptance-test-technician-certification-provider-program

2016 Approved Compliance Software:
https://www.energy.ca.gov/title24/2016standards/2016_computer_prog_list.html

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The Energy Commission welcomes feedback on Blueprint.
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BLUEPRINT

CALIFORNIA ENERGY COMMISSION

EFFICIENCY DIVISION

IN THIS ISSUE

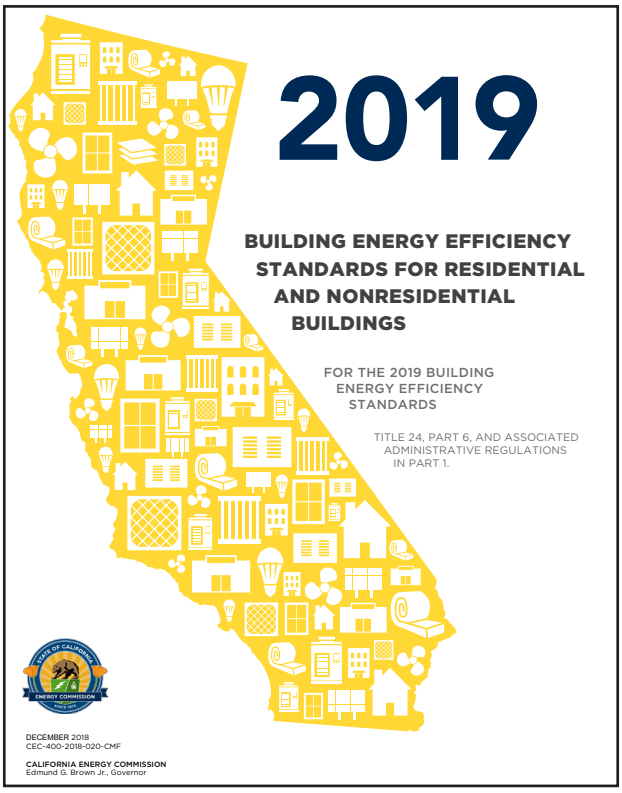
2019 ENERGY CODE TRAINING

Do you want to learn more about the *2019 Building Energy Efficiency Standards* (Energy Code)? The California Energy Commission's Building Standards Outreach and Education (O&E) Unit is available to provide training at no charge. The O&E Unit can provide sessions that range from one-hour general or topic specific presentations, to full-day sessions. We are an International Code Council (ICC) Preferred Provider, and can offer continuing education units for attendees. If you would like to schedule a training session at your location, email **Title24@energy.ca.gov**.

Are you looking for a webinar training to attend online? Consider the training options from our partner Energy Code Ace or a training offered by one of your local utilities. No matter which training option you choose, we want to make sure you are getting the information you need for the upcoming 2019 Energy Code.

The 2019 Energy Code documents are available **here.**

Subscribe to the Blueprint Newsletter for more information on the upcoming 2019 Energy Code requirements.



NEW VIDEOS FOR NONRESIDENTIAL HVAC PRESCRIPTIVE REQUIREMENTS

New educational videos are now available on the Online Resource Center (ORC). These videos provide an overview of the 2016 Energy Code prescriptive requirements for HVAC systems in nonresidential, high-rise residential, hotel and motel buildings. To view the videos listed below, please visit the **ORC.**

Prescriptive Requirements for Nonresidential Space Conditioning Systems

- Course 2A: Prescriptive Approach Overview
- Course 2BC: Size, Equipment Selection and Calculations
- Course 2D: Power Consumption of Fans
- Course 2EFN: Space Conditioning Systems Controls
- Course 2G: Electric Resistance Heating
- Course 2H: Heat Rejection Systems
- Course 2IJ: Water Chillers
- Course 2K: Hydronic System Measures
- Course 2L: Air Distribution Duct Leakage Sealing
- Course 2M: Fan Control
- Course 2O: Economizers
- Course 2P: Performance Approach Overview
- Course 2Q: Additions and Alterations

WHOLE HOUSE FAN COMPLIANCE FOR LOW-RISE RESIDENTIAL BUILDINGS

Installing and using a whole house fan (WHF) can be an effective way to cool a home through ventilation cooling. Ventilation cooling uses high volumes of outdoor air to cool the indoor space instead of air conditioning. **Section 150.1(c)12** of the 2016 Energy Code covers the prescriptive requirements for ventilation cooling. It requires the installation of a WHF in newly constructed single-family buildings in climate zones 8 through 14. These prescriptive requirements also apply to additions with greater than 1,000 ft^2 of conditioned floor area (CFA) to existing single-family buildings within the same climate zones.

To comply with the 2016 Energy Code, the following criteria for WHF installations must be met:

- Provide at least 1.5 cubic feet per minute (CFM) of air flow for each square foot of CFA by one or more WHFs; and
- Provide at least 1 ft^2 of attic vent free area for each 750 CFM of WHF air flow, or the manufacturer's specified attic vent free area, whichever is greater; and
- Provide the homeowner a one-page "How to Operate Your Whole House Fan" informational sheet; and
- WHFs must be listed in the Energy Commission's **Modernized Appliance Efficiency Database System** (MAEDbS).

For more information on these requirements, see **Section 4.7.10** of the 2016 Residential Compliance Manual.

Additionally, only the rated airflow values listed in the MAEDbS should be used to demonstrate WHF compliance. These values are determined by the test procedures in the Home Ventilating Institute's Publication 916 (HVI-916) in accordance with the requirements of Title 20, California Code of Regulations, **Section 1604(d)**, Table D-3.

Enforcement agencies can compare documented values on the Certificate of Installation form (CF2R-MCH-02-E) with those listed in MAEDbS to verify compliance. For assistance with searching MAEDbS, contact the Title 20 Compliance Assistance Call Center at (888) 838-1467 or e-mail **appliances@energy.ca.gov**.

Q&A

TOWNHOUSES VS. DUPLEXES

Is there any difference in classification between a duplex with stacked dwelling units and a duplex with side-by-side dwelling units in the 2016 Energy Code?

No. The Energy Code classifies all group R-3 occupancy buildings with any number of stories, including duplexes, as low-rise residential. The 2016 California Building Code (Title 24, Part 2) classifies buildings that do not contain more than two dwelling units as a group R-3 occupancy. The enforcement agency has the final authority on classifying the occupancy for all buildings.

Since a townhouse has shared walls and no shared ceilings or floors, are side-by-side duplexes also considered townhouses?

No. A duplex is not considered a townhouse. The 2016 Energy Code defines townhouses as having three or more attached dwelling units. Duplexes are only two units, which can be either stacked or side-by-side, while townhouses are only side-by-side.

Are all duplex buildings, regardless of the configuration or the number of habitable stories, modeled as two separate single-family low-rise buildings?

Yes. All duplexes are modeled as two separate single-family buildings using Energy Commission approved compliance software for residential buildings. For more on how to model low-rise residential buildings, see the CBECC-Res **2016 User Manual**.

Are low-rise residential townhouse dwelling units modeled as individual single-family buildings?

Yes. Low-rise residential townhouses are modeled as individual single-family units. For more on modeling low-rise residential buildings, see the CBECC-Res **2016 User Manual**.

Are high-rise residential townhouse buildings modeled as multi-family buildings?

Yes. High-rise residential townhouses are modeled as one multi-family building using Energy Commission approved compliance software for nonresidential buildings. For more on how to model high-rise residential buildings, see the CBECC-Com **2016 User Manual**.

FOR MORE INFORMATION

Online Resource Center:
https://www.energy.ca.gov/title24/orc/

Home Energy Rating System:
http://www.energy.ca.gov/HERS/

Acceptance Test Technician Certification Provider Program:
http://www.energy.ca.gov/title24/attcp/

Approved Compliance Software:
http://www.energy.ca.gov/title24/2016standards/2016_computer_prog_list.html

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CEC-400-2019-004

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Issue 124 | October - December 2018

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CALIFORNIA ENERGY COMMISSION
EFFICIENCY DIVISION

IN THIS ISSUE

CENTER OF GLASS CALCULATIONS FOR LOW-RISE RESIDENTIAL BUILDINGS

Center of glass calculations have a limited application in low-rise residential projects and require extra documentation to support the calculated values. The process for using this approach is described in Reference Appendices Nonresidential Appendix **NA6** (NA6).

Low-rise residential center of glass calculations can only be used for a total site-built window area of up to 250 ft^2 or 5 percent of the conditioned floor area (CFA), whichever is greater, per NA6. Site-built fenestration is defined in **Section 100.1** of the *2016 Building Energy Efficiency Standards* (Energy Code) as fenestration designed using factory cut pieces manufactured with the intention of being assembled at the construction site. This is not to be confused with field-fabricated fenestration, which is entirely built in the field. The U-factor and solar heat gain coefficient (SHGC) of site-built fenestration products may either be rated by the National Fenestration Rating Council (NFRC), come from the default values listed in the tables in **Section 110.6**, or be calculated using NA6.

NA6.5 includes a comprehensive list for the builder and installer to follow to ensure: the energy consultant is given the proper information for the manufacturer and type of glass; accurate documentation is provided to the enforcement agency; and that the correct product is installed. The manufacturer's literature should be submitted with the certificate of compliance documentation and worksheets.

To calculate the U-factor and SHGC, use Equations NA6-1, NA6-2, and Table NA6-5 to determine the values and create a default label for each window.

Equation NA6-1

U-factor = C1 + (C2 x Center of Glass U-factor)

Equation NA6-2

SHGC = 0.08 + (0.86 x Center of glass SHGC)

Table NA6-5 – U-factor Coefficients

Product Type	Frame Type	C_1	C_2
Site-built vertical fenestration	Metal	0.311	0.872
	Metal thermal break	0.202	0.867
	Non-metal	0.202	0.867
Skylights with a curb	Metal	0.711	1.065
	Metal Thermal Break	0.437	1.229
	Non-Metal	0.437	1.229
Skylights with no curb	Metal	0.195	0.882
	Metal thermal break	0.310	0.878
	Non-metal	0.310	0.878

For the performance method, the values needed for center of glass calculations depend on the compliance software used. For CBECC-Res or Right-Energy, use Equations NA6-1 and NA6-2, and Table NA6-5 to determine the values to input into the software.

Alternatively, EnergyPro allows an input for center of glass values, and the calculations from NA6 are incorporated into the software. The CF1R-PRF-01-E form will list the adjusted values being modeled by EnergyPro. Note that the modeled center of glass efficiencies of site-built fenestration products could result in a compliance penalty, and the mandatory requirement in **Section 150.0(q)** of a maximum 0.58 U-factor cannot be traded off.

When using the prescriptive method, start with either the CF1R-NCB, CF1R-ALT, or CF1R-ADD form, and then include the CF1R-ENV-02 and CF1R-ENV-03 form if using an area weighted average or shading to comply. These forms along with the default labels will document if the fenestration meets the prescriptive requirements per **Section 150.1**.

When the enforcement agency receives the certificate of compliance documentation, the plan checker confirms:

1. The U-factor and SHGC values are on the plans and forms.
2. The center of glass values of the fenestration product on the manufacturer's documentation.
3. The area limits (greater of 250 ft^2 or 5 percent of CFA).

The building inspector later verifies the installed fenestration efficiency values match the compliance documentation and the actual area of site-built fenestration does not exceed the allowed limit.

RESIDENTIAL REPLACEMENT WINDOW INSULATION

For residential replacement and retrofit windows, the 2016 Energy Code require insulation to be installed between the new fenestration product and the rough opening. When retrofit windows are installed into existing frames, a new void is created that did not previously exist. The rough opening in a window retrofit is the inside-to-inside dimensions of the existing frame, commonly referred to as the pocket.

The fenestration product manufacturer's installation specifications should be followed when installing retrofit windows. The space between the new window and rough opening shall be completely filled with insulation and the cavity must be airtight. See Figure 1. When batt insulation is used, it should be cut to size and placed properly around the fenestration product. Stuffing of the insulation is not permitted. Low expanding foam may be used to fill the gaps and voids when allowed by the manufacturer.

For more on the installation requirements for retrofit windows, see the **CF2R** installation forms.

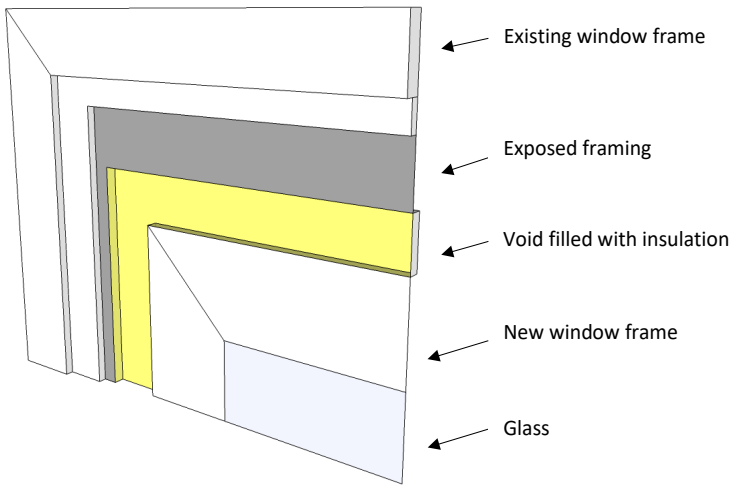

Figure 1 - Retrofit window insulation

NEW VIDEOS FOR NONRESIDENTIAL HVAC MANDATORY REQUIREMENTS

New educational videos are available at the **Online Resource Center** (ORC). These videos review the 2016 Energy Code mandatory requirements for HVAC in nonresidential, high-rise residential, and hotel and motel buildings.

Mandatory Requirements for Nonresidential Space Conditioning Systems

- Course 1A: Introduction - Mandatory, Prescriptive and Performance Requirements: Understanding the Differences
- Course 1B: Requirements for Ventilation
- Course 1C: Required Controls for Space Conditioning Systems
- Course 1D: Requirements for Pipe Insulation
- Course 1E: Requirements for Air Distribution System Ducts and Plenums
- Course 1F: Required Nonresidential Mechanical System Acceptance

TOWNHOUSE CLASSIFICATIONS

Historically, the low-rise residential requirements of the Energy Code have been applied to townhouses as single-family dwellings with an R-3 building occupancy classification, regardless of the number of stories. However, due to changes in the California Building Code, the high-rise residential requirements of the Energy Code may apply to taller townhouses. Title 24, Part 2 and 2.5, classify townhouses three or less stories above grade, with a separate means of egress, as occupancy group R-3, and townhouses more than three stories as occupancy group R-2.

The Energy Code defines a low-rise residential building as a building, other than a hotel or motel, that is occupancy group R-2, multifamily with three or less habitable stories; or occupancy group R-3, single family; or an occupancy group U building, located on a residential site. A high-rise residential building is defined as a building, other than a hotel or motel, occupancy group R-2 or R-4, with four or more habitable stories. High-rise residential buildings must meet the Energy Code requirements for nonresidential buildings, and dwelling units within the building must meet the low-rise residential Energy Code requirements for water-heating and lighting.

Determining whether a townhouse will need to meet the low-rise residential or high-rise residential requirements of the Energy Code depends on how the townhouse is classified by the enforcement agency and the number of habitable stories. If the townhouse is classified as R-3, the low-rise residential standards will apply. If the townhouse is classified as R-2 and has four or more habitable stories, the high-rise residential standards will apply. If the townhouse is classified as R-2 and has three or less habitable stories, the low-rise residential standards will apply.

Figure 2 - Occupancy Group R-2 Townhouses

Q&A

TOWNHOUSES: HIGH-RISE OR LOW-RISE

Townhouses with four conditioned stories above grade that have an R-2 group occupancy will be constructed, but one story is an entry landing with stairs. Are these townhouses classified as low-rise residential or high-rise residential buildings?

This is low-rise residential. This is an R-2 group occupancy with three habitable stories or less. See Figure 2. A habitable story is defined as space in which humans may work or live in reasonable comfort with 50 percent or more of its volume is above grade. Additionally, habitable space is defined as space for living, sleeping, eating, or cooking. Bathrooms, toilets, hallways, storage areas, closets, utility rooms, and similar areas are not considered habitable space. A conditioned story with only an entry landing and stairs is not considered a habitable story.

If there are multiple R-2 group occupancy townhouses in one building and only one of them is four stories, is the entire building a four story, high-rise residential building or is each unit looked at individually?

This is high-rise residential. This building is an R-2 group occupancy with four or more habitable stories. Any townhouses that are attached and sharing common walls, and that consist of one structure are considered to be one building. A building with an R-2 group occupancy that has four or more habitable stories is considered a high-rise residential building.

A project consists of townhouses that are broken up into two levels that are connected by an unconditioned, sometimes exterior, walkway. The project description labels these townhouses as having four stories, but only three are habitable. Would the townhouses in this project be considered high-rise residential buildings?

No. These townhouses will be considered low-rise residential buildings. It is up to the enforcement agency to determine the building group occupancy. Regardless of an R-2 or R-3 group classification, these townhouses have three habitable stories and will be considered low-rise residential buildings.

Townhouses that are all R-2 group occupancy will be built into a steep hillside with more than four stories above the grade plane, however only three stories are habitable space. See Figure 3. Are these townhouses low-rise residential buildings?

Yes. Buildings with an R-2 group occupancy and three habitable stories or less will be classified as low-rise residential buildings.

For more information see, the **Energy Code for Townhomes** presentation on the ORC.

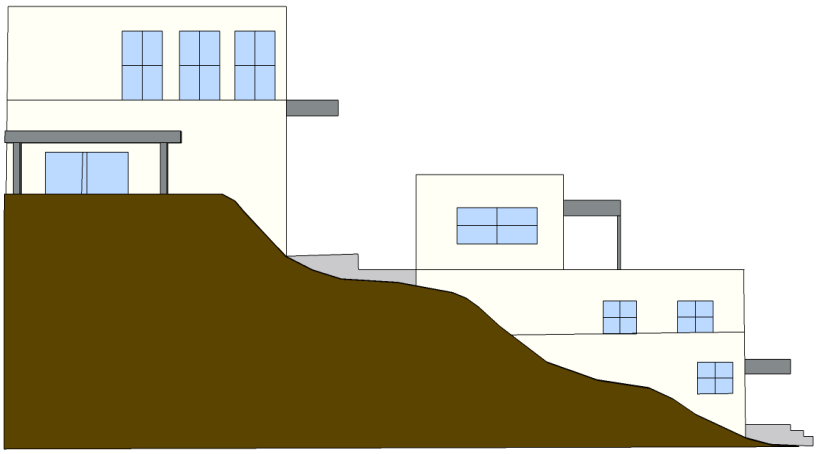

Figure 3 - Townhouses built into steep hillside

NATURAL GAS AND WATER HEATER INSTALLATION IN ADUs

I am converting a detached garage into an accessory dwelling unit (ADU). Natural gas is connected to the existing home but not the detached garage. Is natural gas considered available to the ADU?

It depends on the method used to document compliance. If using the **addition alone** prescriptive or performance compliance pathway, then it assumes no natural gas is available. If using the **existing plus addition plus alteration** method to document compliance, since the existing building has natural gas available, the addition does as well. For clarification, **Section 100.1** of the 2019 Energy Code now defines natural gas availability as:

> *"...For additions and alterations, natural gas is available if a gas service line is connected to the existing building."*

I am converting an attached garage into an ADU. Natural gas is connected to the building. Can I prescriptively install a heat pump water heater?

No. Per **Section 150.2(a)1Di** when complying prescriptively, a gas water heater that meets the requirements of **Section 150.1(c)8** must be installed.

However, when using the performance method to document compliance, **Section 150.2(a)1Div** allows installation of any water heater as long as the proposed energy budget is equal or less than the standard energy budget. In the performance method the standard water heating energy budget is based on **Section 150.1(c)8Ai.**

I am converting a detached garage into an ADU. Natural gas is not connected to the garage. Can I prescriptively install a heat pump water heater?

Yes. **Section 150.2(a)1Dii** allows for an electric water heater to be installed. Note that a heat pump water heater is a very efficient type of electric water heater to install.

CONCRETE WALL INSULATION

I have a low-rise residential building with concrete walls. Do the mandatory wall insulation requirements of Section 150.0(c) apply to concrete and mass walls?

No. The 2016 Energy Code does not have mandatory insulation requirements for concrete or mass walls for low-rise residential buildings. This includes concrete stem walls. However, there are prescriptive requirements in **§150.1(c)1B** of the 2016 Energy Code for insulating concrete and mass walls.

APPROVED POOL PUMPS

Can I issue a final permit for a pool pump that does not appear in the Energy Commission's Modernized Appliance Efficiency Database System (MAEDBS) approved list?

Yes, if the pool pump appears on the MAEDBS archived list. Per **Section 150.0(p)1A** all pool pumps and pump motors installed shall be listed in the Energy Commission's directory of certified equipment.

Due to a change in federal law, the Energy Commission moved all pool pumps certified prior to February 5, 2018, from the MAEDBS approved list to the archived list.

Code officials should review both the approved list and archived list on MAEDBS. Pool pumps appearing on either list are permissible to be installed in California. For more information see the pool pump **FAQ**.

How do I find the archived list for residential pool pumps on MAEDBS?

Under the search feature in **MAEDBS** click on the appliance type tab. In the category, select pool products, in the appliance type select residential pool pumps. Figure 4. Next, under the appliance status tab, select archived, then click the search button and the list will populate. Figure 5.

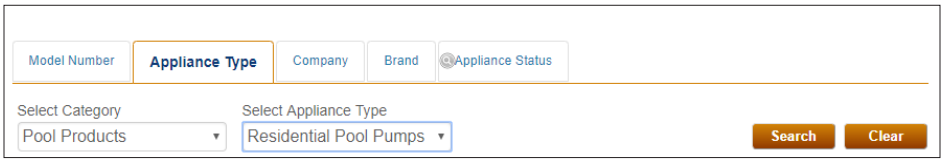

Figure 4 - MAEDBS Appliance Type Tab

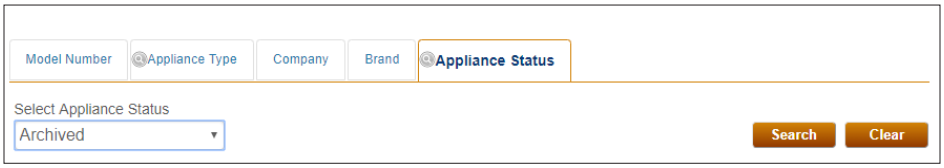

Figure 5 - MAEDBS Appliance Status Tab

FOR MORE INFORMATION

Home Energy Rating System:
http://www.energy.ca.gov/HERS/

Acceptance Test Technician Certification Provider Program:
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Approved Compliance Software:
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EDITOR

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CEC-400-2019-002

Issue 123 | April - September 2018

BLUEPRINT

CALIFORNIA ENERGY COMMISSION

EFFICIENCY DIVISION

IN THIS ISSUE

2019 ENERGY CODE ADOPTED!

The California Energy Commission (Energy Commission) adopted the *2019 Building Energy Efficiency Standards* (Energy Code).

The 2019 Energy Code goes into effect January 1, 2020. Homes built under this Code will use about 53 percent less energy than those under the 2016 Code. Nonresidential buildings are estimated to use about 30 percent less.

Low-Rise Residential Highlights

PV Systems - For the first time, photovoltaic (PV) systems will be required prescriptively for newly constructed low-rise residential buildings, per **Section 150.1(c)14.** There are several exceptions which may allow a reduction in the size of the PV system required.

Quality Insulation Installation - Quality insulation installation becomes a prescriptive requirement in **Section 150.1(c)1E.**

All Electric Homes - A prescriptive pathway for an all electric home is introduced in **Section 150.1**.

Nonresidential, High-Rise Residential, and Hotel/Motel Highlights

Hospitals - For the first time, Occupancy Group I - Institutional (excluding I-3 and I-4) will have to meet the Energy Code for newly constructed buildings. The inclusion of Occupancy Group I is introduced in **Section 100.0(a)**. Additions and alterations to Occupancy Group I buildings do not have to comply.

MERV 13 Air Filters - New mandatory ventilation requirements are introduced in **Section 120.1**. Specified mechanical systems will be required to have minimum efficiency reporting value (MERV) 13 air filters. Air class and recirculation limits introduced based on occupancy categories.

LEDs - Lighting power density will be based on the energy consumption of LEDs instead of linear fluorescent lamps. This change to **Section 140.6**. results in largest energy savings in the 2019 Energy Code.

The **2019 Energy Code** is available for review. More information on the 2019 Energy Code is available in the **frequently asked questions**, infographics for **residential** and **nonresidential** buildings, and **news release**.

MODELING ADUs

The Energy Commission recently updated its software, CBECC-Res, to make it easier to model accessory dwelling units (ADUs). CBECC-Res 2016.3.1 allows users to model wall extensions using the prescriptive exception. Existing wood-framed walls can be modeled without a penalty for not having continuous insulation as long as the siding is not removed. This new version also allows detached additions that do not have a connecting surface to be modeled.

Would you like more information on modeling ADUs? Several resources are available:

- **Frequently Asked Questions About CBECC-Res**
- Energy Code Ace's
  - Code and Coffee with Brian - Residential Modeling: Accessory Dwelling Units (ADU), **Part 1: Newly Conditioned Detached ADU**
  - Code and Coffee with Brian - Residential Modeling: Accessory Dwelling Units (ADU), **Part 2: Newly Conditioned Detached ADU**
  - Decoding ADUs: **Let's Talk Recent Changes**

NONRESIDENTIAL

Including high-rise residential & hotel/motel projects

ACCEPTANCE TESTING For the 2016 Energy Standards

CALIFORNIA ENERGY COMMISSION

When is acceptance testing required?

- Acceptance testing is mandatory for certain nonresidential lighting, mechanical, fenestration, covered processes, and controls.
- Acceptance testing applies when regulated systems or controls are installed in newly constructed buildings, additions, and alterations.
- Any acceptance testing that is required will be specified on the NRCC(s).

Who can conduct acceptance testing?

- Only a lighting **Acceptance Test Technician (ATT)** certified by an ATT Certification Provider (ATTCP) may perform testing for indoor and outdoor lighting systems and controls.
- The builder, contractor, engineer, or commissioning agent may perform testing for HVAC, fenestration, covered processes, and controls.
- A mechanical ATT certified by an ATTCP will be required to perform testing for HVAC systems and controls when the industry thresholds in § 10-103.2 are met.

How do I find an ATT?

- ATTCPs approved by the Energy Commission maintain a directory of certified ATTs on their respective websites (provided on back of this card).
- Search filters, like name and county, are available to make finding an ATT in your area easier.

CERTIFIED MECHANICAL ATTs

The Energy Commission has approved four organizations to train and certify mechanical acceptance test technicians for the 2016 Energy Code. These organizations are:

- **California State Pipe Trades Council** (CSPTC)
- **National Energy Management Institute Committee** (NEMIC)
- **National Environmental Balancing Bureau** (NEBB)
- **Refrigeration Service Engineers Society** (RSES)

At this time, mechanical acceptance testing is not required to be performed by a certified acceptance test technician. Testing by a certified technician will be required when the Energy Commission has confirmed that at least 300 technicians have been certified and are available throughout California.

For more information, visit the **Acceptance Test Technician Certification Provider Program** web page.

Q&A

ADUs

I am converting a garage to an ADU. The walls of the garage are being extended to increase the floor area. What are the insulation requirements for the extended walls?

These walls are treated as wall extensions. Wall extensions can meet the insulation requirements based on the existing dimensions of the walls being extended. This is as described in Sections **150.2(a)1Ai** and **150.2(a)1Bi**, and requires R-15 in 2x4 framing and R-19 in 2x6 framing.

For more on what is considered a wall extension, see *Blueprint* **Issue 118**.

I am converting a detached garage into a pool house. This is not an ADU. Is this considered a newly constructed building or an addition?

This is an addition. This follows the same requirements for detached garages converted to ADUs as described in *Blueprint* **Issue 122.**

NATIVE AMERICAN RESERVATIONS

Are buildings on Native American reservations required to meet the Energy Code?

No. Like buildings on federal land, buildings on Native American reservations are not required to meet the Energy Code.

GAS LIGHTING

Is gas lighting regulated by the Energy Code?

No. Gas lighting, whether for residential or nonresidential buildings, is not regulated by the Energy Code.

BUILT-IN WATER HEATER ISOLATION VALVES

I'm installing an instantaneous water heater that has built-in isolation valves and service ports. These valves and ports allow for the water heater to be flushed as part of regular maintenance. Am I required to install isolation valves as described in Section 110.3(c)7?

No. The built-in isolation valves and ports meet the intent of the Energy Code.

FOR MORE INFORMATION

Home Energy Rating System:
http://www.energy.ca.gov/HERS/

Acceptance Test Technician Certification Provider Program:
http://www.energy.ca.gov/title24/attcp/

Approved Compliance Software:
http://www.energy.ca.gov/title24/2016standards/2016_computer_prog_list.html

The California Energy Commission welcomes your feedback on Blueprint. Please contact Andrea Bailey at: Title24@energy.ca.gov

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CEC-400-2018-016

Issue 122 | January - March 2018

BLUEPRINT

California Energy Commission
Efficiency Division

In This Issue

CBECC-Res FAQs Updated

Do you have questions about CBECC-Res, the free residential compliance software from the California Energy Commission (Energy Commission)? The Commission publishes **Frequently Asked Questions (FAQs) about CBECC-Res** that addresses hot topics related to the software. The FAQs were recently updated and include seven new questions and answers.

Fewer and Simpler Nonresidential Forms

One of the Energy Commission's goals is to reduce the number of compliance documents (forms). The 47 prescriptive nonresidential certificates of compliance (NRCC) are being cut to 10 forms. There will be one form for each building component – lighting, envelope, mechanical, etc. This lessens confusion about when to use which form.

These simplified forms incorporate dynamic features. Each form follows a similar format and offers similar features, simplifying completion and review.

Five **dynamic forms** have already been posted for:

- Electrical Power Distribution
- Indoor Lighting
- Outdoor Lighting
- Sign Lighting
- Solar Ready

The five forms that will be posted in the future are for:

- Commissioning
- Covered Processes
- Envelope
- Mechanical
- Water Heating

These forms are available for use now! Enforcement agencies may continue to use the static forms at their discretion. When the *2019 Building Energy Efficiency Standards* (Energy Code) is implemented, these 10 reformatted NRCC forms will be the only prescriptive nonresidential forms used.

Simplified 2016 Power Distribution and Solar Ready Forms

Two simplified forms are now available to document compliance with the nonresidential electrical power distribution (ELC) and solar ready (SRA) requirements. These forms simplify the compliance process for everyone involved including the contractor, plans examiner, and building department. They are project specific and expand and contract based on the project scope – reducing the total number of pages of forms for most projects.

New features include:

- One signature block
- Table C – Compliance Results give a quick check of the inputs on the first page and will indicate if the project "COMPLIES"
- User selections limit drop-down menus and table options to guide users toward compliant designs
- Hyperlinks to the Energy Code

The new **NRCC-ELC-E** and **NRCC-SRA-E** are available now.

Enforcement agencies may continue to use the static forms at their discretion.

Thank You, LBO and City of Chico!

The Energy Commission sends a big THANK YOU to the Local Building Officials (LBO) and the City of Chico. LBO worked with the Energy Commission to organize a series of seven classes on the 2016 Energy Code. The classes covered residential envelope, the benefits of modeling, nonresidential lighting, and more.

The City of Chico hosted and promoted these free classes. Attendees included building officials, building department staff, contractors, designers, and energy consultants. Several of these classes provided students with free International Code Council (ICC) Preferred Provider continuing education units.

Is your jurisdiction interested in hosting Energy Code classes? If so, contact the **hotline** for more information.

Covered Processes Quick Reference Guide Available

Do you know when compliance with the Energy Code is triggered for covered processes? The Energy Commission has released the **Covered Processes Quick Reference Guide**. This handy guide tells you when compliance is required, what equipment is covered, and if acceptance testing must be completed.

Rebuilding After Disasters

The Energy Commission gets a lot of questions about which code cycle must be met when rebuilding after a disaster. Per **Section 100.0(a)2**, the code that is in effect on the date you apply for a building permit is the code that must be met. Any building permit application submitted on or after January 1, 2017, must meet the 2016 Energy Code.

For more information, please see Energy Code Ace's ***Recover and Rebuild*** fact sheet.

Presentations Posted

Seven 2016 Energy Code presentations are available for download from the **Online Resource Center**.

The information in these presentations include:

- Covered Processes
- Envelope
  - Cool Roofs
  - Residential
- HVAC
  - Nonresidential
- Lighting
  - Nonresidential
  - Residential
- Water Heating
  - Residential

Regulatory Advisory

The Energy Commission has issued a **regulatory advisory** regarding manufactured fenestration (windows, skylights, and glass doors) labels. There are only two types of acceptable labels – National Fenestration Rating Council (NFRC) labels, or labels that use default values. The advisory reviews labeling requirements and provides samples of acceptable labels, per the requirements of Sections **10-111** and **110.6**.

Accessory Dwelling Units

Accessory dwelling units (ADUs) are most commonly defined as secondary dwelling units on residential lots. They can be used to house family (also known also as granny or in-law units), visitors, or even as rental properties to supplement income. ADUs, like all other residential structures in California, are subject to the Energy Code.

In most instances, when complying with the 2016 Energy Code, ADUs are considered **additions**. Additions are changes to a building that increase conditioned floor area and conditioned volume. The only scenario where an ADU would be considered a **newly constructed building** is if it was a new structure and shared no common walls with the existing building. This means that for compliance with the Energy Code, attached ADUs, as well as converted existing structures, are considered additions.

This issue of *Blueprint* includes frequently asked questions about ADUs. For more information on ADUs, visit the California Department of Housing and Community Development's **website**.

Q&A

Accessory Dwelling Units

When an existing attached unconditioned structure (like a garage) is converted to an ADU, is it an addition or a newly constructed building?

This is an addition. See Figure 1 for an illustration of this example.

Figure 1 - Existing house, attached garage being converted to an ADU

When an ADU is built new sharing a common wall with the existing house, is it an addition or a newly constructed building?

This is an addition. See Figure 2 for an illustration of this example.

Figure 2 - Existing house, newly constructed attached ADU

When an existing detached unconditioned structure (like a garage) is converted to an ADU, is it an addition or a newly constructed building?

This is an addition. See Figure 3 for an illustration of this example.

Figure 3 - Existing house, detached garage being converted to an ADU

When an ADU is built new and is detached from the existing house, is it an addition or a newly constructed building?

This is a newly constructed building. This building would need to meet the requirements as a new building. See Figure 4 for an illustration of this example.

Figure 4 - Existing house, newly constructed detached ADU

When an existing unconditioned structure (like a garage) is converted to an ADU, what requirements do the existing walls need to meet?

These walls are treated as "wall extensions," and can meet the insulation requirements based on their existing dimensions, as described in Sections **150.2(a)1Ai** and **150.2(a)1Bii**. This requires R-15 in 2x4 framing, and R-19 in 2x6 framing.

Do the whole building ventilation requirements apply to ADUs that are additions?

The whole building ventilation requirements apply to additions that are greater than 1,000 square feet. While not required, it is recommended that the whole building ventilation requirements be met for new dwelling units. All other applicable ventilation requirements must be met. For example, if a bathroom or kitchen is part of the addition, the local exhaust requirements for those spaces must be met. More on local exhaust requirements can be found in **Section 4.6.5** of the *2016 Residential Compliance Manual*.

Residential Performance Modeling and HERS Verification

I'm modeling a residential addition. The project includes quality insulation installation (QII), which requires home energy rating system (HERS) verification. Existing heating, ventilation, and air conditioning (HVAC) equipment will be used and less than 40 feet of ducting will be added.

My project only requires HERS verification for QII. Why does the HERS Feature Summary on my certificate of compliance (CF1R) state:

- **Refrigerant charge verification required if a refrigerant containing component is altered**
- **Duct sealing required if a duct system component, plenum, or air-handling unit is altered**

These two statements do not indicate that these verifications are required. They are meant to remind the builder that additional HERS verifications may be required depending on the scope of the project.

Some scopes are not covered in the performance report. For example, an air conditioner compressor is moved to a new location to accommodate an addition. This typically requires the replacement of portions of the refrigerant line or the installation of a new section of line. In some cases, an entirely new refrigerant line is installed. Per the requirements of **Section 150.2(b)1Fiib,** the alteration of a refrigerant containing component, in climate zones 2 and 8-15, triggers refrigerant charge verification. The needed verification is identified on the certificate of installation (CF2R-MCH-01-E).

For more information on residential modeling, visit your software vendor's **FAQ** web page.

LED Trim Kits

Does an LED trim kit, like the one in Figure 5, need to be tested for elevated temperature and marked JA8-2016-E?

No. LED trim kits do not need to be tested for elevated temperature or marked JA8-2016-E. LED trim kits (also called solid state lighting [SSL] downlight retrofit kits) are classified as luminaires, even though they are inserted into existing housing (can). When LEDs are inseparable from the kit, the kit is tested as a luminaire. The elevated temperature test does not apply to luminaires. The Energy Code classifies these kits as luminaires.

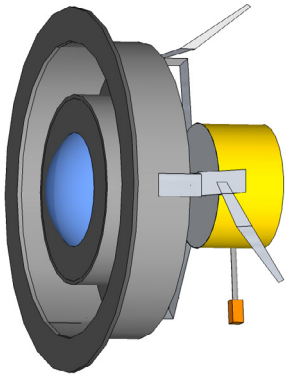

Figure 5 - LED trim kit

For reference, the 2016 Energy Code defines an **inseparable SSL luminaire** as:

> *"A luminaire featuring solid state lighting components such as LEDs and driver components which cannot be easily removed or replaced by the end user, thus requiring replacement of the entire luminaire. Removal of solid state lighting components may require the cutting of wires, use of a soldering iron, or damage to or destruction of the luminaire."*

Insulating Refrigerant Lines

Do refrigerant lines, also referred to as suction lines, for low-rise residential mini-splits have to meet the ¾" insulation requirement in TABLE 120.3-A?

Yes. Suction line insulation for all residential HVAC systems, including mini-splits, must meet the ¾" thickness requirement.

For More Information

Home Energy Rating System:
http://www.energy.ca.gov/HERS/

Acceptance Test Technician Certification Provider Program:
http://www.energy.ca.gov/title24/attcp/

Approved Compliance Software:
http://www.energy.ca.gov/title24/2016standards/2016_computer_prog_list.html

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CEC-400-2018-007

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BLUEPRINT

California Energy Commission
Efficiency Division

In This Issue

IAPMO-R&T Approved

The California Energy Commission (Energy Commission) has **approved** the International Association of Plumbing and Mechanical Officials, Research and Testing (IAPMO-R&T) to certify and rate solar water-heating systems and collectors.

IAPMO-RT maintains a list of products they have certified on their **website**.

Section 150.0(n)3 of the *2016 Building Energy Efficiency Standards* (Energy Code) requires solar water-heating systems and collectors to be certified and rated.

New Fact Sheet

The Energy Commission has developed a **Computer Rooms & Data Centers** fact sheet. This fact sheet summarizes the requirements in **Section 140.9(a)**.

New 2016 NRCC-LTO-E and NRCC-LTS-E

The new **NRCC-LTO-E** and **NRCC-LTS-E** are available. The NRCC-LTO-01-E through NRCC-LTO-04-E and NRCC-LTS-01-E were incorporated into two compliance documents (forms).

The new forms can be used for any nonresidential outdoor or sign lighting projects complying with the Energy Code.

These forms are project specific and expand based on the project scope.

Some of the new features include:

- One signature block
- Table C - Compliance Results gives a quick check of the inputs on the first page and will indicate if the project "COMPLIES"
- User selections limit drop-down menus and table options to guide users toward compliant designs
- Hyperlinks to the Energy Code

Enforcement agencies may continue to use the static forms at their discretion.

Appliance Efficiency Regulations for State Regulated Lamps

Effective January 1, 2018, general service LED lamps and small-diameter directional lamps will be regulated by the Title 20 Appliance Efficiency Regulations (Appliance Standards). State regulated LED lamps with screw base or GU-24 base, including LED retrofit kits designed for recessed can housings, must meet the requirements of the Appliance Standards to be sold or offered for sale in California.

What does this mean with regards to the Energy Code?

Only general service LED lamps and small-diameter directional lamps that are listed in the **appliance database** may be installed, per the requirements in **Section 110.1**. These lamps may also need to meet the 2016 Reference Joint Appendix JA8 (JA8) requirements per **Sections 110.9(e)** and **150.0(k)1A**.

What is the difference between the JA8 and state regulated lamp requirements?

For more information on the differences between the JA8 and state regulated lamp requirements, please review the article "**Title 24's JA8 and Title 20's State Regulated Lamp Requirements"** in *Blueprint,* Issue 117.

Separation of Electrical Circuits

The requirements for separation of electrical circuits (disaggregation of electrical circuits) have been simplified in the 2016 Energy Code. The 2013 Energy Code prescribed specific methods of separating electrical loads. The 2016 Energy Code allows any approach that provides the ability to measure the separate loads of the building.

2016 Energy Code vs. 2013 Energy Code

Section 130.5(b) of the 2013 Energy Code specifically required separate panelboards or subpanels for each load type. This design approach allows for measuring each electrical load at the feeder to the panelboard or subpanel using a current transformer (CT). See Figure 1 for an example of this design approach.

Another method for meeting the requirements is installing a complete metering and measurement system that measures each load type according to the requirements in Section 130.5(b). This method goes beyond the requirements of the Energy Code. Section 130.5(b) requires separation of electrical circuits to provide the capability to monitor individual loads at a later time. It does not require that meters and associated equipment such as CT's to be installed.

The 2016 Energy Code does not require a specific method or design approach for ensuring separation of electrical loads. Any design approach that provides the ability to measure separate loads according to **Section 130.5(b)** may be used.

For example, the system can be designed so that one panel contains multiple load types. Each branch circuit serves a single load type. This allows for measurement of separate loads at each branch circuit. See Figure 2 for an example of this design approach.

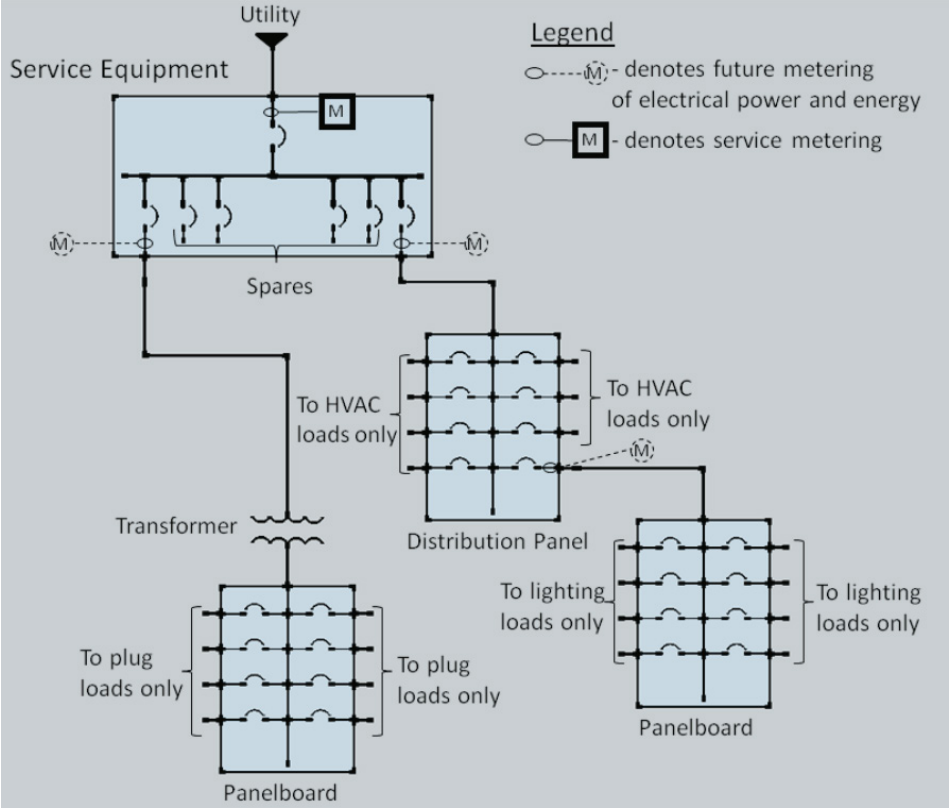

Figure 1 - Loads separated by panelboards and subpanels

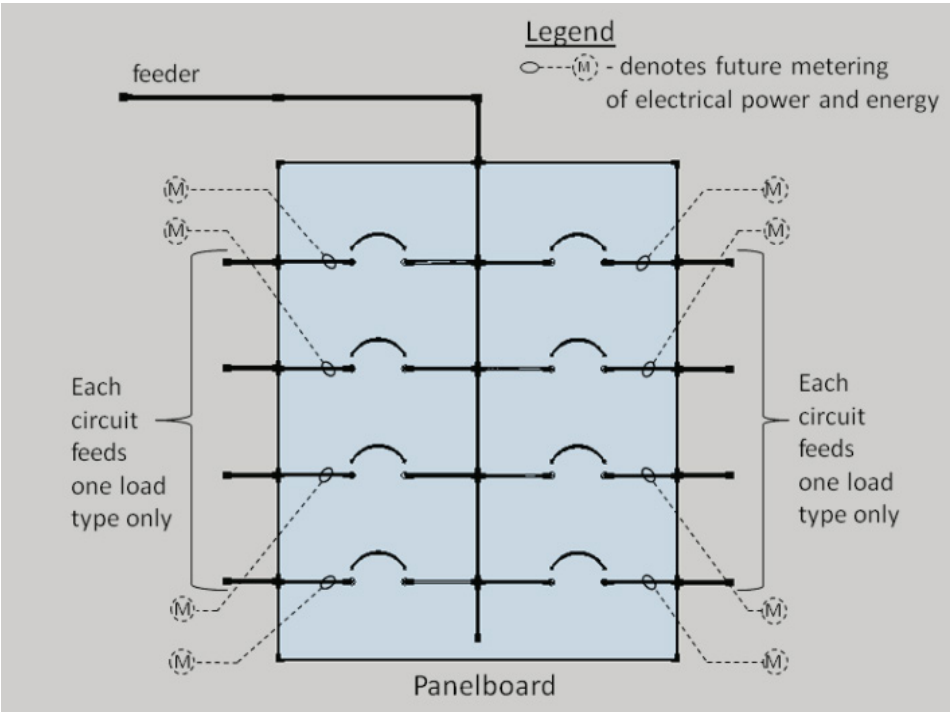

Figure 2 - Loads separated by individual branch circuits

Why Separate Electrical Circuits?

The purpose of separating electrical circuits is to set up a backbone for monitoring the contributions of separate loads to the overall energy use of the building. By designing the electrical power distribution system with separation of electrical loads in mind, energy monitoring can be readily setup and implemented without significant physical changes to the electrical installations. Monitoring the electrical energy usage of each load type provides valuable energy usage information to better understand how much energy has been used by each building system. Analyzing this energy information can help facilitate energy efficiency measures to improve building energy performance.

Conclusion

The 2016 Energy Code provides more flexibility for designing electrical power distribution systems. Whereas the 2013 Code required specific design approaches, the 2016 Code allows any design approach that provides the capability to separately monitor electrical load types according to **Section 130.5(b)**. **Chapter 8** of the *2016 Nonresidential Compliance Manual* provides a few examples, which show design approaches that may be used to meet code requirements.

Q&A

Residential Attic Insulation

When installing roof insulation in a residential attic, does the insulation need to be installed on the entire roof, including areas over unconditioned space?

It depends. The insulation should be installed at the roof either above or below the roof deck in one of the following ways:

1. If the attic is an open or undivided space, then the entire roof should be insulated. This includes portions of the roof over an unconditioned space such as a garage. This is illustrated in Figure 3.
2. If the attic has a continuous air barrier separating the attic over unconditioned space from the attic over conditioned space, then only the portions of the roof over conditioned space should be insulated. It is recommended, but not required, that the air barrier is also insulated. This is illustrated in Figure 4.

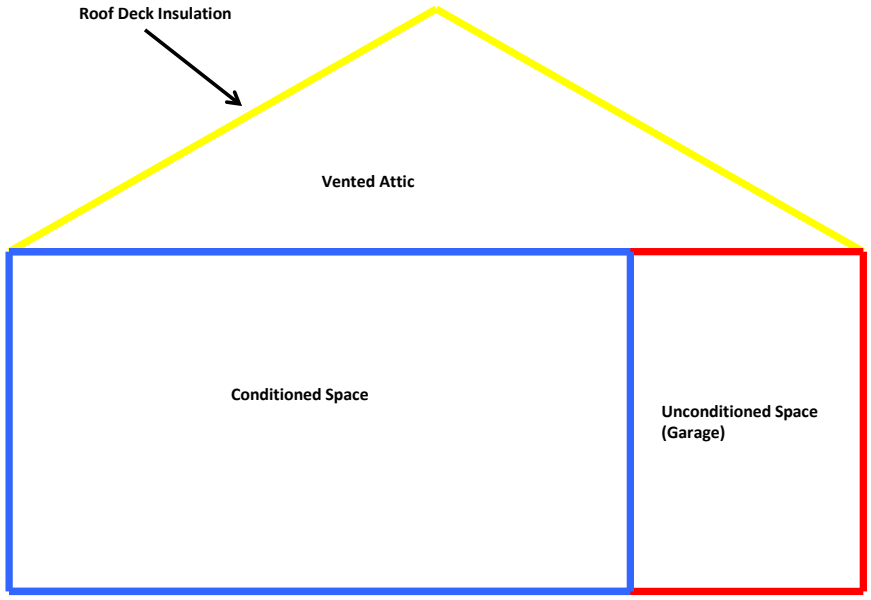

Figure 3 - House with attic insulation extending over conditioned and unconditioned spaces

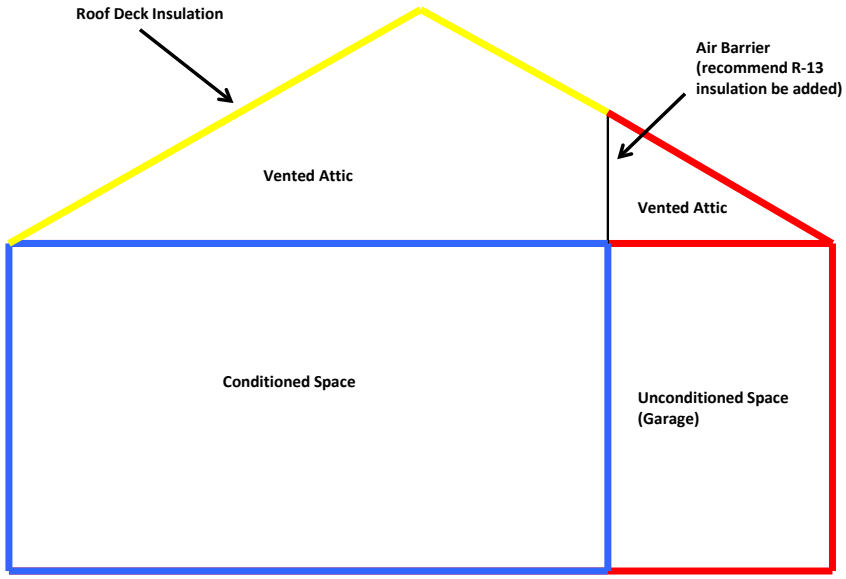

Figure 4 - House with attic insulation extending over conditioned space, attic over conditioned and unconditioned space separated by an air barrier

Pipe Insulation

I am installing a space-conditioning system that uses heated refrigerant for space heating. Should the pipes filled with the heated refrigerant be insulated?

Yes. All pipes carrying refrigerant should be insulated. In this case, insulation is necessary to prevent the refrigerant from losing heat. By reducing heat loss, the equipment does not use extra energy reheating the refrigerant.

Changes are proposed to Sections **120.3** and **150.0(j)2B** of the 2019 Energy Code to require piping for refrigerant to be insulated regardless of the refrigerant being cooled or heated.

I am installing a new solar water-heating system at my house. Which pipes and components of this system need to be insulated?

All of the following must be insulated:

» All new domestic hot water piping (California Plumbing Code, **Section 609.11**)

» Existing accessible piping (**Section 150.2(b)1Gi**)

» Piping from the heating source to the storage tank (**Section 150.0(j)2Aiv**)

» First five feet of cold water piping at the storage tank (**Section 150.0(j)2Ai**)

» Unfired storage tanks (**Section 150.0(j)1**)

Solar water-heating system collector loop piping should be insulated to reduce heat loss. Changes are proposed to **Section 150.0(j)2B** of the 2019 Energy Code to require this piping to be insulated.

If insulation is installed outside of conditioned space, it must be protected from sunlight, moisture, equipment maintenance, and wind per **Section 150.0(j)3**.

See Figure 5 for an example of an insulated solar water-heating system.

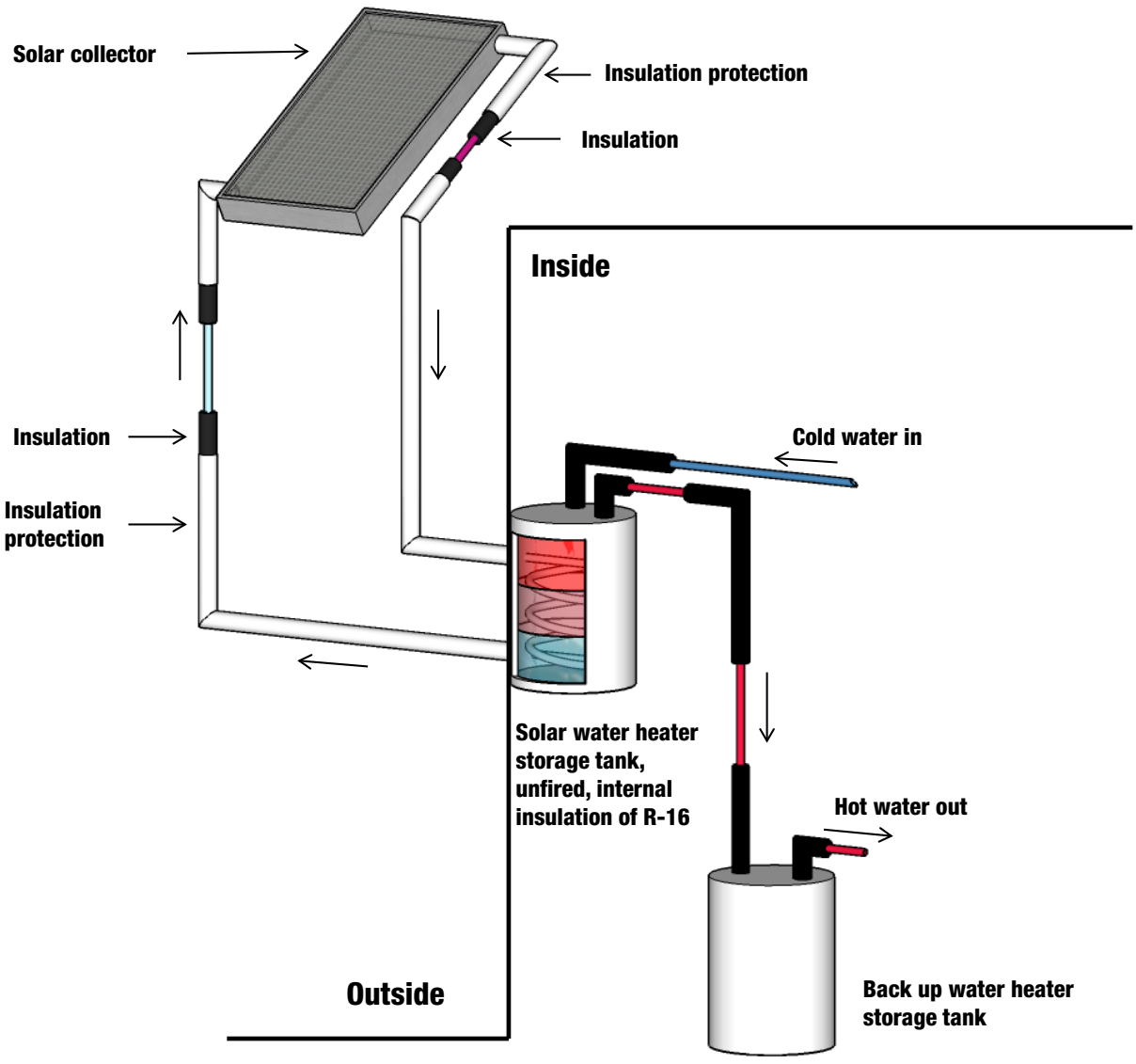

Figure 5 - Solar water-heating system with pipe insulation and insulation protection. Cutouts in insulation and insulation protection are for demonstration purposes only. Where insulation is required, it must be continuous (exceptions may apply).

ENERGY STANDARDS HOTLINE

Available to help with Energy Standards (Title 24, Part 6) questions.

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title24@energy.ca.gov

CALL

800-772-3300
Toll free in CA

916-654-5106
Outside CA

HOURS

8 a.m.–12 p.m. and
1 p.m.– 4:30 p.m.

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Issue 120 | July – September 2017

BLUEPRINT

California Energy Commission
Efficiency Division

In This Issue

New 2016 NRCC-LTI-E!

The new lighting **certificate of compliance (NRCC-LTI-E)** is available now! The NRCC-LTI-01-E through NRCC-LTI-06-E were incorporated into one compliance document (form). Six forms down to one!

The new NRCC-LTI-E can be used for any prescriptive nonresidential indoor lighting project complying with the *2016 Building Energy Efficiency Standards* (Energy Standards). The NRCC-LTI-E is project specific and expands based on the project scope.

Some key features of the NRCC-LTI-E include:

- Major decrease in the amount of pages required to show compliance
- One signature block
- Hyperlinks to the Energy Standards

This form is beneficial to many people:

Enforcement Agencies - Plans Examiners

- Table C - Compliance Results gives a quick check of the inputs on the first page and will indicate if the project "COMPLIES." See the example in Figure 1.
- Table D - Exceptional Conditions auto-generates comments. For example, it will say an exception has been applied or that track lighting is included.
- Table H - Indoor Lighting Controls is split into "Building Level" and "Area Level" controls and shows how compliance is achieved.
- Tables T and U - Both tables automatically indicate the required installation and acceptance forms, eliminating guesswork.

Lighting Designers and Energy Consultants

- All calculations and transfer of numbers are automatic, limiting the chance for errors.
- User selections limit drop-down menus and table options to guide users toward compliant designs.
- No more wondering which lighting forms to submit. There is just one compliance form for all prescriptive nonresidential indoor lighting projects.
- All tables hyperlink to applicable sections of the Energy Standards to limit confusion about what requirements are being documented.

A completed **NRCC-LTI-E sample** is available for review.

Enforcement agencies may continue to use the NRCC-LTI-01-E through NRCC-LTI-06-E at their discretion.

"COMPLIES with Exceptional Conditions" refer to Table D for guidance.

Watts)				Actual Lighting Power per §140.6(a) (Watts)					Compliance Results
		05		06	07	08		09	10
					Adjustments				
3	=	**Total Allowed** (Watts)	≥	Total Designed (Watts)	Portable Lighting §140.6(a) (-)	PAF Control Credits §140.6(a)2 (-)	=	**Total Actual** (Watts) *Includes Adjustments	**05 Must be ≥ 09** §140.6
L)				(See Table F)	(See Table J)	(See Table R)			
	=	**8,365**	≥	6,740	36		=	**6,704**	**COMPLIES**
	=		≥				=		
Controls Compliance (See Table H for Details)								**COMPLIES with Exceptional Conditions**	
Rated Power Reduction Compliance (See Table S for Details)								**Not Applicable**	

Figure 1 - An example from Table C of the new NRCC-LTI-E. At the right, we see that the project "COMPLIES" with the lighting power requirements. For controls compliance, the project "COMPLIES with Exceptional Conditions." We also see that rated power reduction compliance is "Not Applicable" to this project.

New Lighting Videos and Fact Sheets!

New educational videos and fact sheets are available at the **Online Resource Center** (ORC). These videos and fact sheets address the 2016 Energy Standards lighting requirements for residential and nonresidential buildings.

Residential

Videos: High Efficacy Lighting for Residential Applications

- Module 1: Overview of High Efficacy Lighting
- Module 2: High Efficacy Luminaires
- Module 3: Joint Appendix JA8 Performance Requirements
- Module 4: Efficacy Requirements Applied

Fact Sheet: High Efficacy Lighting for Residential Applications

Nonresidential

Videos: Lighting Controls Acceptance Testing

- Module 1: Introduction to Acceptance Testing
- Module 2: Acceptance Testing Requirements
- Module 3: Compliance Process
- Module 4: Certification & Training

Fact Sheet: Lighting Controls Acceptance Testing

Videos: Nonresidential Lighting Alterations and Additions

- Module 1: Overview Indoor Lighting Alterations
- Module 2: Indoor Lighting Alterations Compliance Process
- Module 3: Outdoor Lighting Alterations

Fact Sheet: Lighting Alterations

Videos: Nonresidential Lighting Controls

- Module 1: Introduction to Lighting Control Systems
- Module 2: Area Controls
- Module 3: Multi-Level Lighting Controls
- Module 4: Shut-OFF Controls
- Module 5: Automatic Daylighting Controls
- Module 6: Demand Responsive Controls
- Module 7: Outdoor Lighting Controls for Nonresidential Buildings

Fact Sheet: Indoor Shut-OFF Controls

2016 Acceptance Forms From CALCTP and NLCAA

California Advanced Lighting Controls Training Program (CALCTP) and the National Lighting Contractors Association of America (NLCAA) have been approved to provide their own acceptance forms (NRCAs) for their technicians. These forms follow the format, order, and content of the Energy Commission's forms.

All lighting NRCAs should be completed electronically and bear either CALCTP's or NLCAA's logo.

Enforcement agencies should only accept CALCTP's or NLCAA's acceptance forms. These include:

- Lighting Control (NRCA-LTI-02-A)
- Automatic Daylighting Control (NRCA-LTI-03-A)
- Demand Responsive Lighting Control (NRCA-LTI-04-A)
- Institutional Tuning PAF (NRCA-LTI-05-A)
- Outdoor Lighting Control (NRCA-LTO-02-A)

CALCTP and NLCAA are both lighting controls acceptance test technician certification providers (ATTCPs). ATTCPs are approved by the Energy Commission to train, certify, and oversee acceptance test technicians (ATTs). These technicians complete the NRCAs.

Section 10-103(a) allows the Executive Director to approve alternative forms such as CALCTP's and NLCAA's.

For more information, please visit the **ATTCP program** web page.

2019 CBECC-Res Research Version Now Available!

CBECC-Res 2019.0.4, a research version of the compliance software, is available for download.

This software is for users who wish to model projects using the 2019 Energy Standards. This version uses the draft 2019 Energy Standards. Results from this version cannot be used for compliance. The results are subject to change as the development of the 2019 Energy Standards continues.

Features in this version include:

- Improved compliance and summary results screen
- Insulation values accept decimal input, along with additional compressed insulation selections
- Target design energy design rating (EDR) score tool
- Battery storage option
- Selectable photovoltaic (PV) system size limiter

The **Quick Start Guide** summarizes major changes in CBECC-Res 2019.0.4 compared to previous versions of CBECC-Res.

Technical support

If you need general help with the software, please check the **CBECC-Res FAQs** and the user manual available in the software. For additional assistance, please contact:

cbecc.res@gmail.com
If you send the .ribd file, be sure to include the CBECC-Res version number.

Uniform Energy Factors for Water Heaters

The energy efficiency for water heaters will now be reported as uniform energy factor (UEF). This is a result of updates made to the federal testing requirements for water heaters. UEF allows consumers to more accurately compare the efficiency of different types of water heaters.

The **Water Heater Efficiency Guide** has been updated to reflect the minimum required UEF.

Q&A

Water Heater Types

What is the difference between consumer and residential-duty commercial (RDC) water heaters?

The difference is the input rating. Consumer water heaters have a lower input rating than RDC water heaters.

For example, consumer gas-fired storage water heaters have an input rating of 75,000 Btu/h or less. RDC gas-fired storage water heaters have an input rating greater than 75,000 Btu/h, but not exceeding 105,000 Btu/h.

RDC water heaters are commercial water heaters that have features that are suited for residential uses.

Want to know more? See **Section 5.2** of the *2016 Residential Compliance Manual*.

For More Information

Home Energy Rating System:
http://www.energy.ca.gov/HERS/

Acceptance Test Technician Certification Provider Program:
http://www.energy.ca.gov/title24/attcp/

Approved Compliance Software:
http://www.energy.ca.gov/title24/2016standards/2016_computer_prog_list.html

The California Energy Commission welcomes your feedback on Blueprint. Please contact Andrea Bailey at:
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Issue 119 | April – June 2017

BLUEPRINT

California Energy Commission
Efficiency Division

In This Issue

Tubular LED Lamps and the 2016 Energy Standards

The *2016 Building Energy Efficiency Standards* (Energy Standards) allows tubular light emitting diode (TLED) lamps to replace linear fluorescent lamps in existing luminaires. The power of luminaires with TLED lamps is determined according to **Section 130.0(c)6** and depends on whether the luminaire uses a fluorescent ballast or LED driver.

TLED Lamp with Fluorescent Ballast

If a fluorescent ballast powers the TLED lamp, luminaire power is determined according to the operating input wattage of the lamp and ballast combination per **Section 130.0(c)6A.**

Reference Nonresidential Appendix NA8 (NA8) has tables of lamp and ballast combinations. These tables provide an alternate method for determining luminaire power for any lamp and ballast combination specifically listed in NA8.

To determine luminaire power where fluorescent ballasts are used with TLED lamps, find the matching ballast and type/length of linear or U-shaped fluorescent lamp and use the value given in the table. If more than one value applies, use the smallest appropriate value.

TLED Lamp with LED Driver

If an LED driver powers the TLED lamp, luminaire power is determined according to the maximum input wattage of the driver per **Section 130.0(c)6B**.

Examples:

For a two-lamp luminaire with 4-foot TLED lamps and fluorescent ballast, the lowest wattage in **Table NA8-3** corresponds to two-lamp F32T8/30ES, EE reduced output ballast at 45 watts. Therefore, luminaire power is 45 watts.

For a three-lamp luminaire with 3-foot TLED lamps and fluorescent ballast, the lowest fluorescent wattage in **Table NA8-3** corresponds to three-lamp F25T8, electronic reduced output ballast at 59 watts. Therefore, luminaire power is 59 watts.

For a two-lamp luminaire with 4-foot TLED lamps and LED driver, the manufacturer rated input wattage of the driver is 30 watts. Therefore, luminaire power is 30 watts.

HVAC Videos Now Available!

Educational videos are now available on the Online Resource Center (ORC). These videos support the 2016 Energy Standards for heating, ventilation, and air-conditioning (HVAC) requirements in low-rise residential buildings. To view the videos listed below, please visit the **ORC**.

- Course 1: Introduction - Mandatory, Prescriptive, and Performance Requirements - Understanding the Differences
- Course 2: What's New in 2016
- Course 3: Mandatory Measures for Heating and Cooling Systems
- Course 4: Automatic Setback Thermostats
- Course 5: Mandatory Measures for Air Distribution Systems
- Course 6: Indoor Air Quality and Mechanical Ventilation
- Course 7: Prescriptive Method of Compliance
- Course 8: Performance Method of Compliance
- Course 9: HVAC Alterations and Changeouts

High Performance Attics and Batt Insulation Below the Roof Deck

The 2016 Energy Standards introduced prescriptive high performance attic requirements for low-rise residential buildings in **Section 150.1(c)1A**. The high performance attic requirements are satisfied in one of two ways:

1. By insulating the roof and attic floor of a vented attic.
2. By bringing the HVAC system inside the conditioned space and insulating the attic floor of a vented attic.

In a scenario where insulation is placed at the roof and attic floor, insulation can be installed at the roof level either above or below the roof deck. When installed below the roof deck, insulation can be in the form of blown-in netted insulation, spray polyurethane foam, or batt insulation, among others.

When no air space is provided between the roofing product and the roof deck, like with asphalt shingles, the prescriptive requirement for insulation installed below the roof deck is R-18 in climate zones 4 and 8 through 16. When batt insulation thickness exceeds the depth of the roof framing members, full width batts should be used to prevent sagging. Batts must also be supported with straps when specified by the manufacturer's instructions. Compression at the straps is assumed and is acceptable. Below deck batt or blanket insulation must be installed in a manner that does not obstruct eave, ridge, or eyebrow vents to allow for adequate attic ventilation. The required net free ventilation area of all eave and roof vents must be maintained. Eave vent baffles should also be installed to prevent air movement under or into the batt. See Figures 1 and 2 for examples of this type of assembly.

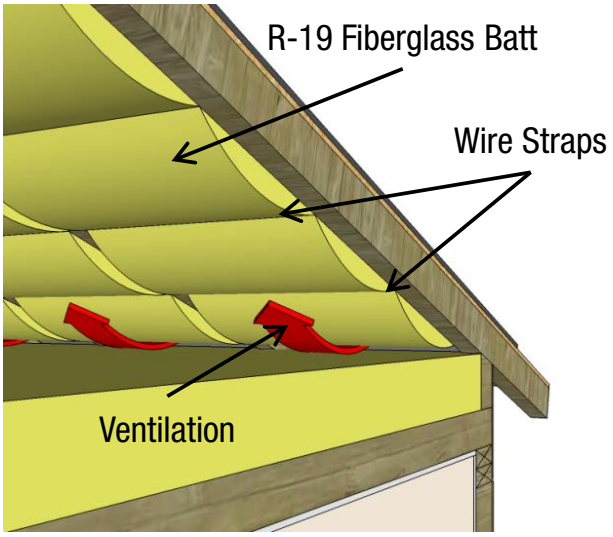

Figure 2 - Angled, three dimensional view of roof assembly with below roof deck insulation secured at regular intervals.

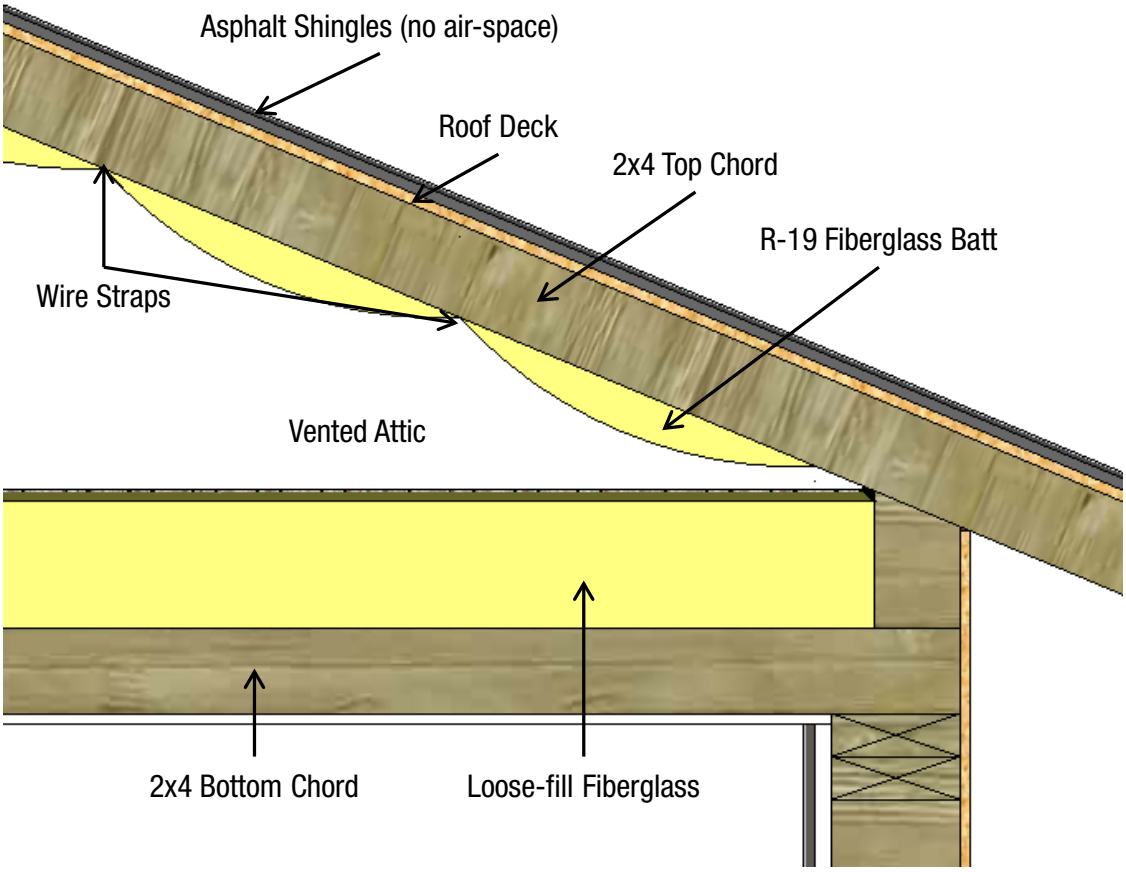

Figure 1 - Side view of roof assembly with below roof deck insulation secured at regular intervals.

Electrical Power Distribution Systems

The applicability of electrical power distribution (EPD) system requirements to additions and alterations has been updated in the 2016 Energy Standards. The separation of electrical circuit and controlled receptacle requirements are now only applicable to entirely new or complete replacements of EPD systems per **Sections 141.0(a)**, **141.0(b)2P**, and **141.0(b)3.** This update was made to facilitate compliance with the EPD system requirements for additions and alterations.

The "entire EPD system" includes the service equipment and all EPD equipment downstream from the service equipment. The 2016 Energy Standards defines **service equipment** as:

> *"The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service conductors to a building or other structure, or an otherwise designated area, and intended to constitute the main control and cut-off of the supply."*

Additions to or partial replacements of existing EPD systems no longer trigger the separation of circuit or controlled receptacle requirements under the 2016 Energy Standards.

New Resources Added to the Online Resource Center!

Energy Code Ace resources for the 2016 Energy Standards are available on the **ORC**. Checklists, fact sheets, trigger sheets, and application guides have been added for:

- Commissioning
- Electrical Power Distribution
- Lighting
- HVAC
- Solar Ready
- And more

The ORC is the central location for Energy Standards educational resources.

Q&A

Tubular LED Lamps

Is there a definition for TLEDs and are there requirements that apply specifically to these products?

No. TLED products are not defined nor handled differently from other LED retrofit approaches. LED retrofit options for fluorescent luminaires include products that use the existing lamp holders. They also include products that are installed in existing fluorescent troffers that do not make use of the lamp holders.

How are LED retrofits for fluorescent luminaires rated and classified? Are they rated differently if they are part of an addition, alteration, or repair?

LED retrofits are rated and classified according to **Section 130.0(c)** whether they are a new installation, addition, alteration, or repair. The classification is based on the permanently installed components of the luminaire, not the lamps. If the retrofit is made up of LED lamps that use existing fluorescent ballasts for power, then the luminaire will be classified under **Section 130.0(c)6A**. If the retrofit is made up of LED lamps paired with a driver, then the luminaire will be classified under **Section 130.0(c)6B**. Luminaires with LED light engines are classified under **Section 130.0(c)9**.

I'm considering a lamp changeout of an existing lighting system. There will be no alterations to the wiring or lighting system other than installing new lamps (I am just replacing tubular fluorescent lamps with tubular LED lamps). Does this trigger 2016 Energy Standard requirements?

No. However, if lamps and ballasts are replaced, or if you bypass the ballast and use a driver, the project may trigger luminaire component modification requirements in **Section 141.0(b)2J**.

I'm considering replacing tubular fluorescent lamps with TLED lamps as part of a larger lighting system alteration. What method can I use to determine the luminaire power for these luminaires?

To comply with **Section 130.0(c)6**, NA8 can be used to determine luminaire power where fluorescent ballasts are used with TLED lamps. Find the matching ballast and type/length of linear or U-shaped fluorescent lamp, and use the value given in the table. If more than one value applies, use the smallest appropriate value.

Electrical Power Distribution Systems

Would an alteration of a branch circuit trigger the separation of circuit requirements of Section 141.0(b)2Pii?

No. Since this alteration is not a complete replacement of the existing EPD system, the separation of electrical circuit requirements do not apply.

Would adding a new panel to an existing electrical power distribution system trigger the separation of circuit requirements of Section 141.0(b)2Pii?

No. Adding one panel does not constitute a complete replacement of an EPD system.

I have a retail tenant improvement. We are stripping the entire space of all panels and electrical wiring, including the service equipment. Does this alteration trigger the separation of circuit requirements of Section 141.0(b)2Pii?

Yes. This is a complete replacement of the EPD system.

Would adding receptacles to an existing office trigger the controlled receptacle requirements of Section 141.0(b)2Piv?

No. Because the entire EPD system is not being replaced, the controlled receptacle requirements are not applicable.

I have a retail tenant improvement. We are stripping the entire space of all panels and electrical wiring, including the service equipment. Does this alteration trigger the controlled receptacle requirements of Section 141.0(b)2Piv?

Yes. This is a complete replacement of the EPD system.

My project includes an addition of office space to an existing building. If I have an existing service to which no modification is being done, are controlled receptacles required for the new office space?

No. Because the entire EPD system is not being replaced, the controlled receptacle requirements are not applicable.

For More Information

Home Energy Rating System:
http://www.energy.ca.gov/HERS/

Acceptance Test Technician Certification Provider Program:
http://www.energy.ca.gov/title24/attcp/

Approved Compliance Software:
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CEC-400-2017-008

Issue 118 | January – March 2017

BLUEPRINT

California Energy Commission
Efficiency Division

In This Issue

2019 Energy Standards Development

Even though the *2016 Building Energy Efficiency Standards* (Energy Standards) just took effect, planning for the 2019 Energy Standards is already in progress. The Statewide Utility Codes and Standards Team (Utility Team) is a group of representatives from publicly and privately owned utilities that supports the California Energy Commission (Energy Commission) with revising the Energy Standards. The goal is to achieve energy savings through reasonable and cost-effective changes to the Energy Standards.

The evaluation by the Utility Team is one part of the 2019 Energy Standards development process. The Energy Commission will be hosting workshops to propose and evaluate additional requirements including residential photovoltaics (PV).

The **proposed requirements** being evaluated by the Utility Team for the 2019 Energy Standards affect:

- Nonresidential lighting
- Residential and nonresidential heating, ventilation, and air conditioning (HVAC)
- Residential and nonresidential indoor air quality and ventilation
- Residential and nonresidential demand response
- Residential water heating
- Residential and nonresidential envelope
- Process

The Utility Team is hosting a series of **webinars** throughout March. Each webinar covers a specific topic related to the proposed changes. Public participation is welcome and encouraged. These webinars provide an opportunity to share input on the proposed recommendations to the Energy Commission. The **agendas and presentations** for each webinar are posted. **Sign up** for an invite to attend the webinars and to stay informed about the utility-sponsored outreach process.

For more information, contact the Utility Team at:
Email: **info@title24stakeholders.com**

2016 Energy Standards are in Effect

The 2016 Energy Standards went into effect on January 1, 2017. Permit applications submitted on or after this date must meet the requirements of the 2016 Energy Standards.

Many great resources are available to help with implementation, including:

- **Online Resource Center**
- **Energy Standards Hotline**
- **Quick Linked TABLE 100.0-A**
- **2016 Residential and Nonresidential Compliance Manuals**
- **2016 Compliance Software**
- **2016 Low-Rise Residential Mandatory Measures Summary**

2016 Compliance Software

The Energy Commission has approved several compliance software programs for the 2016 Energy Standards.

For residential buildings, the following programs are approved:

» CBECC-Res

» EnergyPro

» Right-Energy Title 24

For nonresidential buildings, the following programs are approved:

» CBECC-Com

» EnergyPro

» IES Virtual Environment

The list of approved software versions and their corresponding approval and expiration dates is available on the **compliance software** web page.

Open Source Software

CBECC software is now open source. This makes all of the source code of one of the world's most advanced building modeling software programs available to the public for free. Other entities can now alter the source code to help meet their energy efficiency goals.

CBECC software is a free computer program developed by the Energy Commission. This software is used to demonstrate compliance with the Energy Standards.

The open source project is available at:
https://github.com/CBECC-software/cbecc

2016 HERS Providers

The Energy Commission has approved CalCERTS and CHEERS as Home Energy Rating System (HERS) providers for the 2016 Energy Standards.

CalCERTS, Inc. is approved to train and certify HERS raters for:

» Field verification and diagnostic testing for newly constructed and additions to residential buildings.

» Field verification and diagnostic testing for alterations of residential and nonresidential buildings.

» California whole-house home energy ratings.

CalCERTS may be reached at:
Email: **info@calcerts.com**
Phone: (877) 437-7787

CHEERS is approved to train and certify HERS raters for:

» Field verification and diagnostic testing for newly constructed and additions to residential buildings.

» Field verification and diagnostic testing for alterations of residential buildings.

CHEERS may be reached at:
Email: **info@CHEERS.org**
Phone: (800) 424-3377

HERS providers are approved based upon several factors, including their ability to:

» Train and certify HERS raters.

» Create and maintain a registry and database.

» Provide ongoing access to their registry and database for Energy Commission staff.

» Create a quality assurance program and conduct quality assurance inspections on their HERS raters' work.

» Report annually to the Energy Commission as required by Title 20.

For more information, please visit the **HERS program** web page.

2016 HERS Reference Card Now Available

The Energy Commission has released the **2016 HERS reference card**. This card is designed to help quickly identify when HERS verification is required and how to find approved providers. A preview of the new HERS card is provided in Figure 1.

2016 Compliance Document Upgrades

The **2016 compliance documents** for residential projects that do not require HERS verification have been upgraded. Some of the new features include:

» Improved compatibility with free PDF viewers

» Saving has been enabled

» **Digital signatures** have been incorporated

The selection of documents for projects that do not require HERS verification has also been expanded. These documents were previously only available through a HERS registry. The newly available documents include:

» Pool and spa heating systems

» Solar water heating systems

» Whole house fans

These documents do not have watermarks and do not require registration with a HERS provider.

NOTE: All compliance documents for a project must be registered with a HERS provider if HERS verification is required or modeled for compliance credit.

Lighting ATTCP Training Approved for the 2016 Energy Standards

The Energy Commission has approved the California Advanced Lighting Controls Training Program's (CALCTP) nonresidential lighting controls Acceptance Test Technician Certification Provider (ATTCP) application updates for the 2016 Energy Standards. CALCTP can now train, certify, and recertify lighting controls acceptance test technicians (ATTs) and their employers under the 2016 Energy Standards.

For more information, visit the **ATTCP** web page.

Training Opportunities

Did you know that the utilities provide free Energy Standards training? These opportunities are available throughout the state. Training schedules are now conveniently listed on the Energy Commission's **Utility Sponsored Training Schedules** web page.

Training sessions are offered in a variety of formats, including in person, live webinar, and on demand. It is likely there is a session that fits your schedule.

Be sure to check back often as schedules are updated regularly.

NOTE: Opportunities offered by investor-owned utilities are listed jointly through Energy Code Ace. Opportunities provided through publicly owned utilities are listed individually.

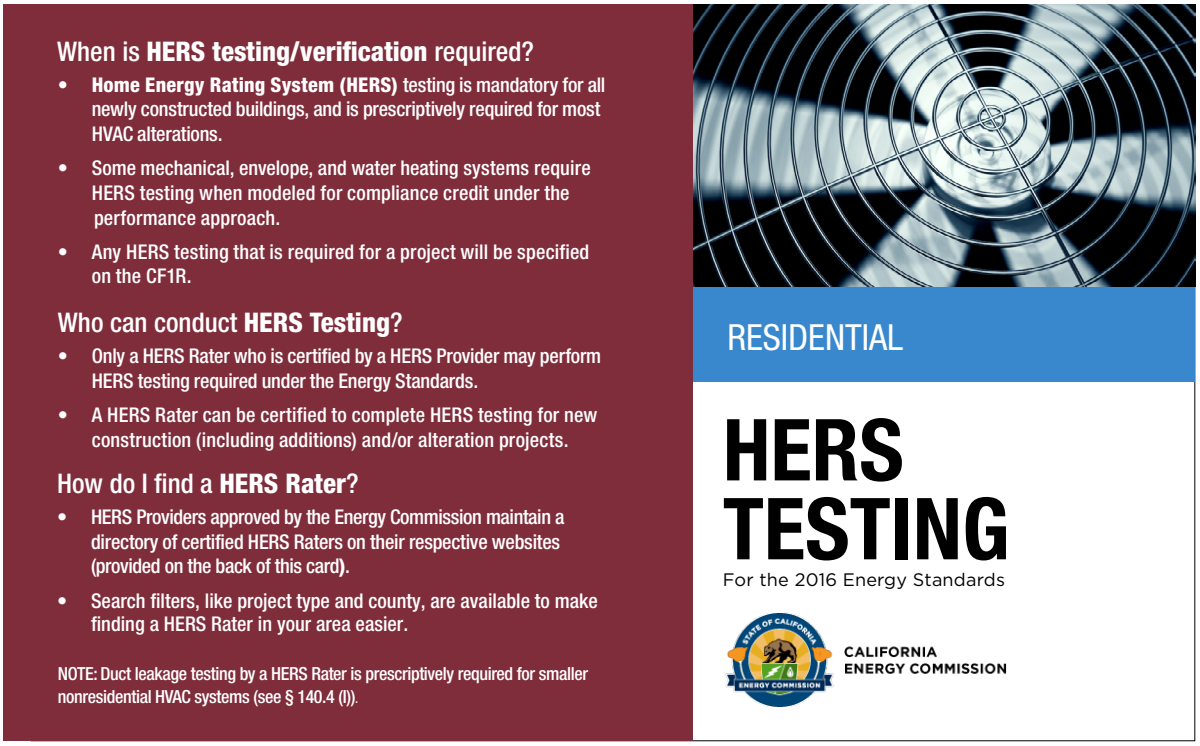

Figure 1 - 2016 HERS Reference Card

Q&A

Sun Rooms

The *2016 California Residential Code* (CRC) introduced sunroom categories. One of these sunrooms, a Category IV, is conditioned but non-habitable. Are Category IV sunrooms subject to the requirements of the Energy Standards?

Yes. **Section 100.0(c)1** requires all conditioned space in a story to comply with the Energy Standards. The requirements of the Energy Standards apply regardless of the space being habitable or non-habitable.

Section R301.2.1.1.1 of the CRC defines Category IV sunrooms as:

> *"A thermally isolated sunroom with enclosed walls. The sunroom is designed to be heated or cooled by a separate temperature control or system and is thermally isolated from the primary structure..."*

Category IV sunrooms are **directly conditioned** if they are provided with mechanical heating exceeding 10 Btu/hr-ft^2 or mechanical cooling exceeding 5 Btu/hr-ft^2. Sunrooms meeting this definition must meet all applicable requirements, including:

- Envelope
- Lighting
- Mechanical
- Solar ready
- Water heating

Buildings and Spaces Used for Commercial Plant Growth

Are buildings and spaces used for commercial plant growth regulated by the Energy Standards?

Yes. These buildings and spaces are within the scope of the Energy Standards, and the nonresidential requirements apply.

What requirements must be met if the building or space used for commercial plant growth is conditioned?

Directly and **indirectly conditioned** spaces must meet all applicable requirements, including:

- Envelope
- Lighting
- Power distribution
- Mechanical
- Solar ready
- Water heating

Are buildings or spaces used for commercial plant growth that use only an evaporative cooler (swamp cooler) for space conditioning subject to any requirements of the Energy Standards?

Yes. These buildings and spaces must meet all of the applicable requirements for unconditioned nonresidential buildings, which primarily consists of lighting and power distribution requirements. Cooling of a space by direct or indirect evaporation of water alone is not considered **mechanical cooling**.

Do grow lights in buildings and spaces used for commercial plant growth have to meet the prescriptive lighting power allowance requirements of Section 140.6?

Yes. **Section 140.6(a)** requires the total watts of all permanent and portable lighting systems be used to calculate the actual indoor lighting power. However, **Section 140.6(a)3G** excludes the lighting wattage of grow lights if they are controlled by a multi-level astronomical time-switch control. The multi-level astronomical time-switch control must be listed in the **Appliance Efficiency Database**.

Grow lights are still subject to the applicable mandatory indoor lighting requirements, including:

- General lighting (**Section 130.0**)
- Indoor lighting controls (**Section 130.1**)
- Acceptance testing and installation certificates (**Section 130.4**)

Wall Extensions in Low Rise Residential Additions

The 2016 Energy Standards allow for the extension of existing wood-framed walls in additions to retain the dimensions of existing walls. What is considered a wall extension as described in Sections 150.2(a)1Ai and 150.2(a)1Bii?

Figures 2 through 4 are examples of common ways new walls are connected to existing walls.

In Figures 2 and 3, the new wall extends out straight from an existing wall. These are considered wall extensions. The new walls in Figures 2 and 3 are 2x4 framing, and are only required to have R-15 cavity insulation. If the existing wall had 2x6 framing, the new wall would also have 2x6 framing and would require R-19 cavity insulation (not shown).

In Figure 4, the new wall is perpendicular to the existing wall. This is not a wall extension, and is subject to the prescriptive insulation requirements of **Section 150.1(c)1B**. In most cases, this will require 2x6 framing with both cavity and continuous insulation.

NOTE: The figures show horizontal wall extensions. These requirements are also applicable to vertical wall extensions such as a second floor addition.

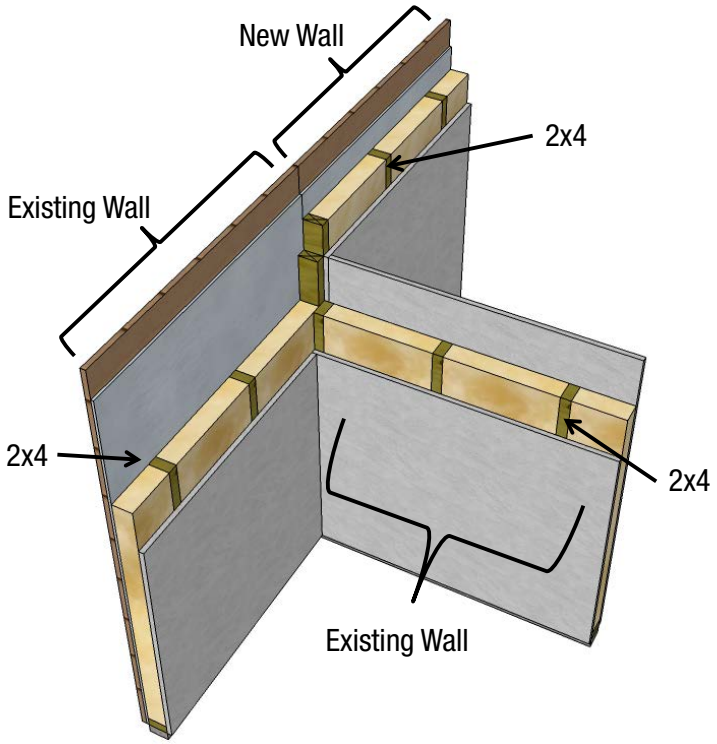

Figure 3 - The new wall extends out straight from one of the existing walls.

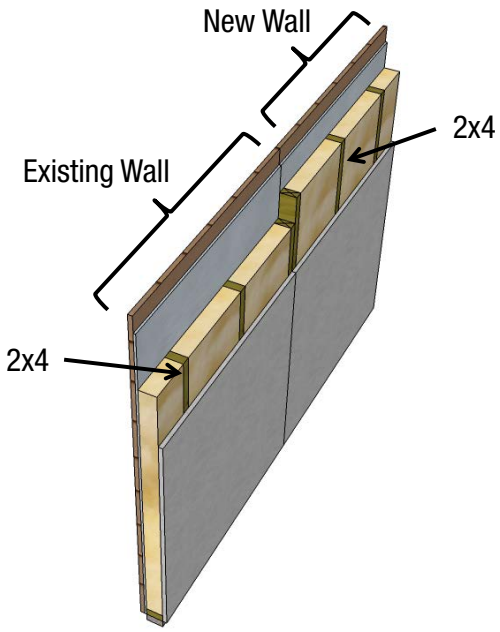

Figure 2 - The new wall extends out straight from the existing wall.

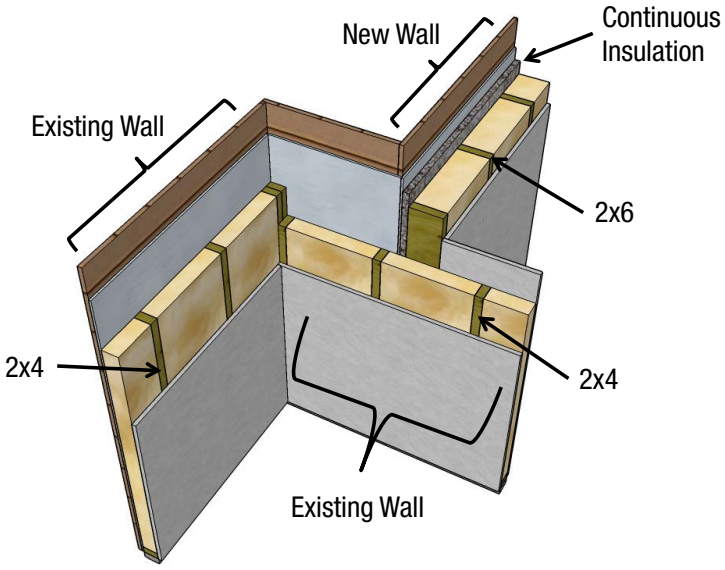

Figure 4 - The new wall extends out perpendicularly from the existing wall.

Residential Compliance Documents

Are residential compliance documents always required to be registered with a HERS provider?

No. All compliance documents must be registered only if HERS verification is required or modeled for compliance credit.

Examples of prescriptive projects that do not require registered compliance documents include:

» Roof surface replacements

» Water heater replacements

» Window replacements

» Non-ducted wall furnace replacements

Compliance documents for these types of projects are available without watermarks.

Do all residential projects require compliance documents?

No. **Sections 10-103(a)1C** and **10-103(a)3C** state that enforcement agencies may, at their discretion, choose not to require compliance documents for prescriptive residential alteration projects that do not require HERS verification. Prescriptive additions less than 300 ft^2, which do not require HERS verification, may also be exempted from submitting compliance documents.

For More Information

Home Energy Rating System:
http://www.energy.ca.gov/HERS/

Acceptance Test Technician Certification Provider Program:
http://www.energy.ca.gov/title24/attcp/

Approved Compliance Software:
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BLUEPRINT

California Energy Commission
Efficiency Division

The Lighting Issue

Title 24's JA8 and Title 20's State Regulated Lamp Requirements

JA8 Requirements for High Efficacy Lighting

The ***2016 Reference Joint Appendix JA8*** (JA8) specifies minimum performance and quality requirements for high efficacy light sources. Effective January 1, 2017, certain high efficacy light sources must be JA8 certified before they can be installed in residential buildings for compliance with the *2016 Building Energy Efficiency Standards* (Energy Standards). Light sources that must be JA8 certified are listed in the right-hand column of **Table 1**.

Other light sources, such as pin based compact fluorescent lamps (CFL), linear fluorescents, high intensity discharge lamps (HID), and outdoor solid state lighting (SSL) luminaires do not necessarily need to be JA8 certified. These light sources are listed in the left-hand column of **Table 1**.

JA8 certified light sources must undergo thorough testing at an accredited testing laboratory[1] to ensure that the light sources meet all JA8 performance requirements. Some of the metrics tested include:

» Color rendering index (CRI)

» Correlated color temperature (CCT)

» Dimming

» Elevated temperature

» Flicker

» Lifetime

» Light source efficacy

JA8 certification ensures that installed light sources provide high quality, energy efficient, and long lasting illumination. This certification also helps to avoid issues such as delayed start, audible noise, flickering, overheating, or other problems associated with lighting technologies. JA8 certified light sources are required to have a JA8-2016 or JA8-2016-E[2] marking to indicate that the light source is certified to the California Energy Commission (Energy Commission). Additionally, JA8 light sources must be listed in the Energy Commission's **Modernized Appliance Efficiency Database System (MAEDBS)**.

[1] The light source under test shall be tested at a testing laboratory participating in the ISO/IEC 17025, by the National Voluntary Laboratory Accreditation Program (NVLAP) or other laboratory accreditation body operating in accordance with ISO/IEC 17011 and produced under an ongoing inspection program carried out by a Type A inspection body in accordance with ISO/IEC 17020.

2016 JA8 High Efficacy Light Sources Certification Process

Certification of high efficacy light sources is completed by the manufacturer or a designated third party certifier. The manufacturer or third party certifier submits light source products for testing at an accredited testing laboratory. The laboratory must conduct light source testing in accordance to the methods described in JA8. If the light source meets all JA8 requirements, product and testing data must be recorded on the **data certification forms** and submitted to the Energy Commission for certification. After the product is certified, the light source product information will be added to MAEDBS.

Appliance Efficiency Regulations for State Regulated Lamps

Effective January 1, 2018, general service LED lamps and small diameter directional lamps will be regulated by the Title 20 Appliance Efficiency Regulations (Appliance Standards). State regulated LED lamps[3] with screw base or GU-24 base, including LED retrofit kits designed for recessed can housings, must meet the requirements of the Appliance Standards to be sold or offered for sale in California.

[2] JA8-2016-E indicates that the light source meets all JA8 requirements and has additionally passed the elevated temperature test for use in ceiling recessed downlights and enclosed luminaires.

[3] "State-regulated Light Emitting Diode (LED) lamp" means a lamp capable of producing light with Duv between -0.012 and 0.012, and that has an E12, E17, E26, or GU-24 base, including LED lamps that are designed for retrofit within existing recessed can housings that contain one of the preceding bases. State-regulated LED lamp does not include a lamp with a brightness of more than 2,600 lumens or a lamp that cannot produce light with a correlated color temperature between 2200 K and 7000 K.

Table 1 - High Efficacy Light Sources	
No JA8 Certification Required	JA8 Certification Required
» Pin-based linear or compact fluorescent light sources using electronic ballasts » Pulse-start metal halide » High pressure sodium » GU-24 sockets containing light sources other than LEDs[a,b] » Luminaires with hardwired high frequency generator and induction lamp » Inseparable SSL luminaires that are installed outdoors » Inseparable SSL luminaires containing colored light sources that are installed to provide decorative lighting	» All light sources in ceiling recessed downlight luminaires[c] » All light sources installed in enclosed luminaires » GU-24 sockets containing LED lamps » All screw base luminaires » Inseparable SSL luminaires installed indoors » Any light source not listed in this table

a. GU-24 sockets containing light sources such as compact fluorescent lamps and induction lamps.

b. California Title 20 **Section 1605.3(k)4** does not allow incandescent sources to have a GU-24 base.

c. Ceiling recessed downlight luminaires cannot have screw base sockets, regardless of the lamp type, as described in **Section 150.0(k)1C**.

State regulated LED lamp regulations set minimum performance requirements which include:

» Chromaticity

» Color consistency

» CRI

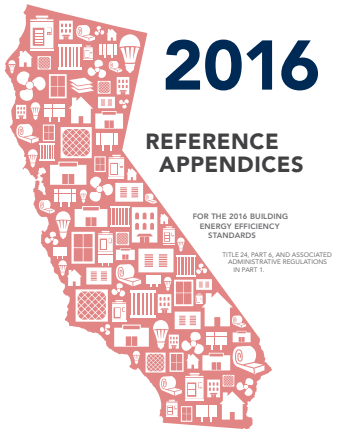
» Lifetime

» Light source efficacy

State regulated small diameter directional lamps[4] are non-tubular directional lamps with a diameter less than or equal to 2.25 inches with an ANSI ANSLG C81.61-2009 compliant pin base or E26 base.

"State-regulated small diameter directional lamp" means a directional lamp that meets all of the following criteria: 1. Capable of operating at 12 volts, 24 volts, or 120 volts; 2. Has an ANSI ANSLG C81.61-2009 (R2014) compliant pin base or E26 base; 3. Is a non-tubular directional lamp with a diameter of less than or equal to 2.25 inches; 4. Has a lumen output of less than or equal to 850 lumens, or has a wattage of 75 watts or less; and 5. Has a rated life greater than 300 hours.

State-regulated small diameter directional lamp includes incandescent filament, LED, and any other lighting technology that falls within this definition. State-regulated small diameter directional lamp does not include directional lamps with an E26 base that utilize LED and are covered under the definition of state-regulated LED lamps.



Small diameter directional lamp regulations set minimum performance requirements which include:

» Lifetime

» Light source efficacy

State regulated LED and small diameter direction lamps must undergo testing at an Energy Commission approved testing laboratory and be certified and listed in MAEDBS in order to be sold or offered for sale in California.

Reference Joint Appendix JA8 High Efficacy Light Sources versus State Regulated Lamp Requirements

The JA8 high efficacy light source requirements differ from the new state regulated lamp requirements. JA8 regulates light sources, including LED and small diameter directional lamps, installed in residential buildings. The Appliance Standards regulate lamps sold or offered for sale in California. LED and small diameter directional lamps may be subject to both the JA8 requirements and the Appliance Standards.

For example, in residential lighting projects, LED lamps must be JA8 certified to be installed for compliance with the high-efficacy light source requirements in the 2016 Energy Standards. This does not mean that all LED lamps must be JA8 certified. A homeowner can purchase and install any LED lamp, including LED lamps which are not JA8 certified, into their existing lighting fixture. However, if installing lighting fixtures with LED lamps in newly constructed buildings or alterations, the installed LED lamps must be JA8 certified. Compliance with this requirement is verified by the enforcement agency at final inspection of the building.

State regulated LED and small diameter directional lamps manufactured on or after January 1, 2018, must meet all performance and quality requirements of the Appliance Standards. This means that all state regulated LED and small diameter directional lamps must be certified to the Energy Commission and listed in MAEDBS. LED and small diameter directional lamps which are JA8 certified must meet the Appliance Standards for state regulated lamps if manufactured on or after this date. State regulated lamps manufactured on or after January 1, 2018, and that do not appear in MAEDBS cannot be legally sold in California. The Energy Commission's **Office of Compliance Assistance and Enforcement** works with manufacturers, distributors, and retailers to ensure these requirements are met.

JA8 and the Appliance Standards specify testing of similar performance and quality metrics for LED and small diameter directional lamps. However, there are differences between the requirements.

For example, JA8 specifies a minimum CRI of 90, while the Appliance Standards specify a minimum CRI of 82 for LED lamps. Both require the CRI to be tested. LED lamps which meet the Appliance Standards do not necessarily meet the JA8 high efficacy light source requirements.

Performance requirements for small diameter directional lamps also differ between JA8 and the Appliance Standards. For example, JA8 specifies a minimum luminous efficacy of 45 lumens per watt for small diameter directional lamps. The Appliance Standards specify a minimum luminous efficacy of 80 lumens per watt or have a minimum luminous efficacy of 70 lumens per watt or greater and a minimum compliance score of 165 or greater, where compliance is calculated as the sum of the luminous efficacy and CRI. Small diameter directional lamps which meet the JA8 high efficacy light source requirements do not necessarily meet the Appliance Standards.

Table 2 shows some of the key differences between JA8 and the state regulated LED lamp requirements.

2016 Prescriptive Indoor Lighting Alteration Options

Sections 141.0(b)2I and **141.0(b)2J** of the 2016 Energy Standards provide three prescriptive compliance options for nonresidential entire luminaire replacements and luminaire component modifications.

Option 1

Install lighting up to the **allowance** for new nonresidential buildings and install the applicable controls for new nonresidential buildings. These controls include:

- Manual area
- Multi-level
- Shut-off
- Automatic daylight
- Demand responsive

Table 2 - Key Differences

Parameter	Title 24 - JA8 (2016)	Title 20 (2016)	
Lamp Type	All Residential (Except Night Lights)	General Service LED Lamps (Tier 1)	Small Diameter Directional Lamps
Effective Date	January 1, 2017	January 1, 2018	January 1, 2018
Base Type	All (Except Night Lights)	E12, E17, E26 and GU-24	ANSI ANSLG C81.61-2009 or E26
Power Factor	≥ 0.9	≥ 0.7	No requirement
Start Time	≤ 0.5 sec	No requirement	No requirement
Lifetime	≥ 15,000 hours	≥ 10,000 hours	≥ 25,000 hours
Dimming	Down to 10 percent	No requirement	No requirement
Efficacy	≥ 45 lm/W	≥ 68 lm/W and *((2.3 x CRI) + lm/W) ≥ 282*	≥ 80 lm/W or ≥ 70 lm/W and *(lm/W + CRI)≥ 165*
CCT	Inseparable ≤ 4000 K Separable ≤ 3000 K	No requirement	No requirement
Chromaticity	-0.0033 ≤ Duv ≥ 0.0033	ANSI C78.377-2015 compliant	No requirement
CRI	≥ 90	≥ 82	No requirement
R1-R8	No requirement	≥ 72	No requirement
R9	≥ 50	No requirement	No requirement

Option 2

Install lighting up to 85 percent of the allowance for new nonresidential buildings and install a reduced set of controls. These controls include:

» Manual area

» Two-level

» Shut-off

Daylight, demand responsive, and full multi-level controls are not required.

Option 3

Install lighting that has a 50 or 35 percent lower rated power than the previously installed lighting and install a reduced set of controls. These controls include:

» Manual area

» Shut-off

Office, hotel, and retail spaces must achieve a 50 percent reduction in rated power. All other spaces must achieve a 35 percent reduction.

Please see **Table 3** for a side-by-side comparison of the three options.

It is important to note that the only difference in control requirements between Options 2 and 3 is that the former requires two-level controls. These controls are already present in many buildings.

Options for different spaces:

Spaces where walls or ceilings will be added, removed, or replaced

For these projects, Option 1 or 2 must be used. Per **Section 141.0(b)2Iii,** Option 3 is not allowed for projects where walls or ceilings will be added, removed, or replaced.

Spaces where the lighting is already using an efficient technology

Options 1 and 2 are most appropriate. To reduce the rated power of an efficient lighting system by 50 or 35 percent may be very difficult or impossible. This makes Option 3 an unlikely choice.

Spaces where the lighting has not been updated for a significant amount of time

Option 3 works well for these types of projects. It may be easy to meet or exceed the 50 or 35 percent rated power reduction by replacing old and inefficient systems with new lighting technology.

Spaces where wiring can be easily accessed, where wiring will be replaced, or where wireless controls are being installed

Option 2 could be used by installing the required controls. These controls can be inexpensive. If a higher power allowance is needed, Option 1 can be used by installing the appropriate controls. Option 3 could be used if the new lighting system has a 50 or 35 percent lower rated power than the previously installed lighting.

Spaces where two-level or multi-level controls are already installed

In these spaces, Option 2 provides a lighting power allowance as it is not dependent on the power use of the existing lighting. If the space already has full multi-level and daylighting controls, Option 1 provides an even higher power allowance. Again, Option 3 could be used if the new lighting system has a 50 or 35 percent lower rated power than the previously installed lighting.

More information about the nonresidential lighting alteration requirements can be found in **Sections 141.0(b)2I-L** of the 2016 Energy Standards and **Sections 5.9.4** and **5.9.5** of the *2016 Nonresidential Compliance Manual*.

Table 3 - Control Requirements for Lighting Alterations

Applicable Section 130.1 Control requirements:	Resulting lighting power, compared to the lighting power allowance specified in **Section 140.6(c)2**, Area Category Method		Option 3 Lighting power is reduced by 35/50% compared to existing
	Option 1 Lighting power is > 85% to 100% of allowance	Option 2 Lighting power is ≤ 85% of allowance	
Sections 130.1(a)1, 2, and 3 Area Controls	Yes	Yes	Yes
Section 130.1(b) Multi-Level Lighting Controls – only for alterations to general lighting of enclosed spaces 100 square feet or larger with a connected lighting load that exceeds 0.5 watts per ft^2	Yes	For each enclosed space, minimum one step between 30-70 percent of lighting power regardless of luminaire type, or meet **Section 130.1(b**)	Not Required
Section 130.1(c) Shut-Off Controls	Yes	Yes	Yes[1]
Section 130.1(d) Automatic Daylight Controls	Yes	Not Required	Not Required
Section 130.1(e) Demand Responsive Controls – only for alterations > 10,000 ft^2 in a single building, where the alteration also changes the area of the space, or changes the occupancy type of the space, or increases the lighting power	Yes	Not Required	Not Required

[1] As bi-level controls are not required for this option, partial-off controls are not required to be installed in place of "full off" automatic shutoff controls for library book stack aisles, corridors and stairwells (see **Sections 141.0(b)2Iii** and **Jii**).

Q&A

What are the effective dates for compliance with the JA8 high efficacy light source requirements and the Appliance Standards state regulated LED lamp requirements?

- January 1, 2017, for JA8 high efficacy light sources installed in residential new construction.
- January 1, 2018, for certification of state regulated LED and small diameter directional lamps manufactured for sale in California.

Do LED lamps need to be JA8 certified?

Yes, if the LED lamp is installed in lighting projects that require compliance with the residential high efficacy light source requirements of the 2016 Energy Standards. For example, if screw base luminaires are installed in a newly constructed residential building or in an alteration or addition to a residential building, the installed LED lamps must be JA8 certified. LED lamps do not need to be JA8 certified when replacing or installing lamps in existing luminaires.

Do LED lamps need to be certified to the Energy Commission per the Appliance Standards?

Yes. All state regulated LED and small diameter directional lamps manufactured on or after January 1, 2018, must be certified per the Appliance Standards and listed in MAEDBS to be legally sold or offered for sale in California. Manufacturers can voluntarily certify state regulated LED lamps before January 1, 2018.

Do JA8 certified high efficacy LED lamps need to also be certified per the Appliance Standards?

On or after January 1, 2018, JA8 certified high efficacy LED lamps must also be certified per the Appliance Standards as state regulated LED lamps. Requirements for JA8 and for state regulated LED lamps differ. JA8 certification does not necessarily indicate compliance with the Appliance Standards for state regulated LED lamps or vice versa.

How do I certify a light source to JA8?

Certification to the Energy Commission is completed by the manufacturer of the light source or a designated third party certifier. The light source must be tested at an accredited testing laboratory in accordance with the testing specifications in JA8. The resulting test data must be recorded and submitted to the Energy Commission. Once the Energy Commission has confirmed that data submitted complies with JA8, the light source product information will be listed in MAEDBS.

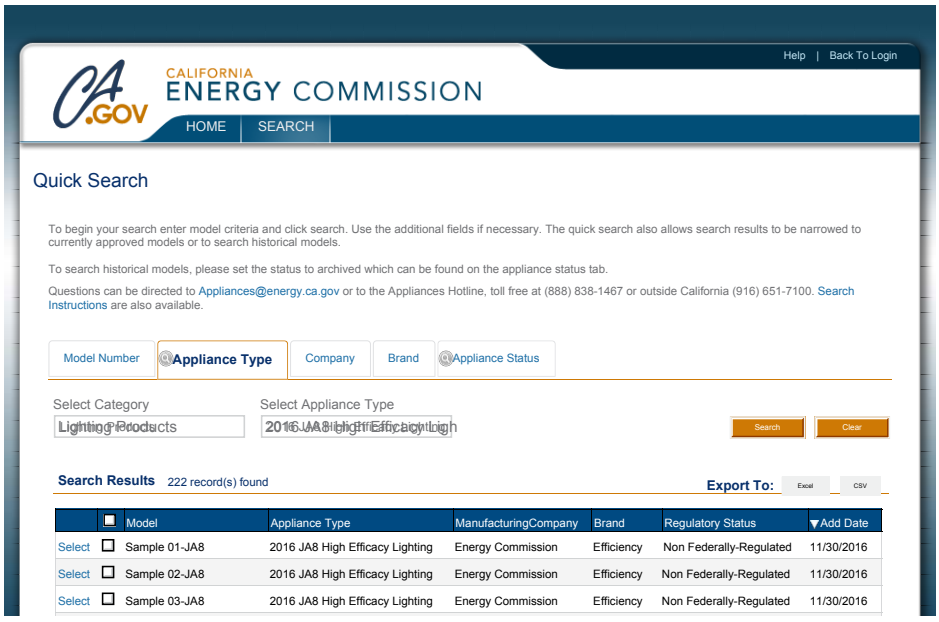
For more information on JA8 certification, please review the **Residential Lighting - JA8 Compliance for Test Laboratories** fact sheet.

Do I, as a manufacturer, have to ship my luminaire with a JA8 certified high efficacy light source?

No. The 2016 Energy Standards do not require luminaires to be prepackaged with a JA8 certified high efficacy light source.

NOTE: **Section 1605.3(n)(3)(A)4** of the Appliance Standards requires portable luminaires[4] with E12, E17, or E26 screw base sockets to be prepackaged and sold together with one screw based compact fluorescent lamp or screw based LED lamp for each screw based socket on the portable luminaire. This requirement applies to portable luminaires only. Screw based lamps used in portable luminaires do not need to be JA8 certified.

[4] "Portable luminaire" means a luminaire that has a flexible cord and an attachment plug for connection to a nominal 120-volt, 15- or 20-ampere branch circuit; that allows the user to relocate the luminaire without any rewiring; that are typically controlled with a switch located on the luminaire itself or on the power cord; and that are intended for use in accordance with the National Electrical Code, ANSI/NFPA 70-2002.



If my product has a lamp shade, do I have to test my product with it on or off?

It depends. If the shade can be removed by the end user, then the light source can be tested without the shade. If the end user does not have the option to remove the shade, the product must be tested with the shade.

How do I know if an LED lamp is JA8 Certified?

Certified light sources are required to have a mark to identify compliance with the JA8 high efficacy light source requirements. JA8 certified LED lamps must be marked with either JA8-2016 or JA8-2016-E. A listing of all JA8 certified LED lamps can be found in MAEDBS.

What happens to light source products that are on the shelf after the effective date that may comply with the 2016 Energy Standards JA8 high efficacy light source requirements but aren't marked with JA8-2016 or JA8-2016-E?

Light sources that must be JA8 certified and that do not have the JA8-2016 or JA8-2016-E marking may not be installed for compliance with the 2016 high efficacy light source requirements on or after January 1, 2017.

Can I install a recessed downlight trim kit with a screw base adaptor?

No. Recessed downlight trim kits in ceilings cannot contain screw base sockets per **Section 150.0(k)1Cv** of the 2016 Energy Standards. The trim kit should be hardwired or connected via quick connector. If the trim kit contains a screw base socket adaptor, the screw base can be removed and the trim kit can be installed as described above.

Are the light sources required to be dimmable?

JA8 high efficacy light sources must be dimmable to a minimum of 10 percent of the light source output per **Joint Reference Appendix JA8.4.6**:

> *"The light source shall be dimmable down to 10 percent light output where 100 percent full light output is defined as operating the light source at the maximum setting provided by the control."*

Are high efficacy lighting requirements applicable to nonresidential buildings and spaces?

No, high efficacy lighting requirements apply only to residential buildings and spaces.

For More Information

Home Energy Rating System:
http://www.energy.ca.gov/HERS/

Acceptance Test Technician Certification Provider Program:
http://www.energy.ca.gov/title24/attcp/

Approved Computer Compliance Programs:
http://www.energy.ca.gov/title24/2016standards/2016_computer_prog_list.html

The California Energy Commission welcomes your feedback on Blueprint. Please contact Andrea Bailey at:
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(800) 772-3300 (toll-free in CA)
Title24@energy.ca.gov

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BLUEPRINT

California Energy Commission
Efficiency Division

In This Issue

Are You Ready for January 1, 2017?

The *2016 Building Energy Efficiency Standards* (Energy Standards) go into effect January 1, 2017. Many great resources are already available to help with implementation, including:

- **2016 Residential** and **Nonresidential Compliance Manuals**
- **2016 Compliance Software**
- **2016 Mandatory Measures Summary**
- **Online Resource Center**

2016 Mandatory Measures Summary Now Available

The California Energy Commission (Energy Commission) has just released the **2016 Low-Rise Residential Mandatory Measures Summary**. The Mandatory Measures Summary is a tool designed to quickly identify mandatory measures at the design phase. This tool is not a compliance document and is not required to be registered with a Home Energy Rating System (HERS) provider. Designers may incorporate this summary into building plans to specify the mandatory measures.

New Project Status Report Available!

The Energy Commission has developed the Project Status Report for residential compliance documents. This report summarizes the status of all compliance documents for a given project, including the Certificates of Compliance (CF1R), Installation (CF2R), and Verification (CF3R). The Project Status Report is available for any project that is registered with an approved HERS Provider.

Enforcement agencies can access the Project Status Report directly through the HERS registries. This provides enforcement agencies the opportunity, at their discretion, to verify the completion of the CF1R, CF2R, and CF3R documents via the web. To determine if a project is ready for a final inspection, both the "Overall" and "HERS Compliance Documents'" status should be marked "complete." If the project is marked complete, this indicates that all of the compliance documents have been completed and signed. Currently, CalCERTS and CHEERS registries have this report available.

Alternatively, this report, like all compliance documents, can be printed for submittal. Enforcement agencies can request that applicants submit a printed report for final inspection. This tool can reduce the amount of documents submitted to the enforcement agency, and assist with compliance verification.

CalCERTS and CHEERS contact information is as follows:

CalCERTS may be reached at:
Phone: (877) 437-7787
Email: **Tech@calcerts.com**
Website: **www.calcerts.com**

CHEERS may be reached at:
Phone: (800) 424-3377
Email: **adminsupport@CHEERS.org**
Website: **www.CHEERS.org**

ENERGY STANDARDS HOTLINE

Available to help with Energy Standards (Title 24, Part 6) questions.

EMAIL
title24@energy.ca.gov

CALL
800-772-3300
Toll free in CA

916-654-5106
Outside CA

HOURS
8 a.m.–12 p.m. and
1 p.m.– 4:30 p.m.

Dynamic Compliance Documents for 2016 Residential Non-HERS Projects

Five dynamic compliance documents are now available for some of the most common residential addition and alteration projects that do not require HERS verification. Contractors and homeowners may use these new CF1Rs and CF2Rs to demonstrate compliance with the 2016 Energy Standards. Many projects will need only three printed pages because they contain only project-specific information. The dynamic features include:

» Embedded instructions – hover over the cells or blue question mark icons to view them.

» Only the necessary tables are generated based on selections made in Table A.

» The ability to add or delete table rows as needed.

These **dynamic compliance documents** are available for download.

Residential Early Adopters

Builders who would like to demonstrate compliance for residential buildings according to the 2016 Energy Standards, before the January 1, 2017, effective date, may do so at the enforcement agency's discretion. Enforcement agencies allowing early adoption should:

» Accept, review, and approve plans and unregistered CF1Rs until a HERS Provider is approved for the 2016 Energy Standards by the Energy Commission.

» Ensure that the residential **computer compliance software** used is approved by the Energy Commission for demonstrating compliance with the 2016 Energy Standards.

» Confirm that CF1Rs are registered before a permit is finaled or a Certificate of Occupancy is issued.

NOTE: All compliance documents for a project must be registered, as appropriate, once a HERS provider data registry is approved for the 2016 Energy Standards.

Master Plan Permit Applications

When builders submit permit applications to an enforcement agency for new residential subdivisions, they often have multiple model homes or "master plan" designs to which all homes in the project will be built. CF1Rs are submitted with the permit application to demonstrate compliance with the Energy Standards.

When registered CF1Rs for new residential subdivisions are submitted to and approved by the enforcement agency, builders can continue to pull permits for all the homes in the subdivision under the approved "master plan" design using the approved CF1Rs, provided the approved "master plan" designs have not been changed.

If one or more of the "master plan" designs have changed, the affected homes will require new CF1Rs with the new permit application. CF1Rs must be generated using a version of the computer compliance software approved for the new permit application date. New CF1Rs are only required for plans that are changed.

Online Resource Center

The new **Online Resource Center (ORC)** is a central location for Energy Standards educational materials. The ORC offers quick access to:

- 2016, 2013, and archived Energy Standards home pages
- A list of topic specific Energy Standards materials
- Acceptance Test Technician Certification Provider (ATTCP) and HERS resources
- Approved compliance software resources
- Blueprint newsletters
- California climate zone information
- Energy Code Ace and other external education providers
- Training and event schedules

The ORC also organizes the following resources by topic:

- Checklists
- Fact Sheets
- Guides
- Presentations
- Trigger Sheets

The layout of the new ORC is shown in Figure 1.

Lighting ATTCP Training Approved for 2016

On September 14, 2016, the Energy Commission approved the National Lighting Contractors Association of America's (NLCAA) nonresidential lighting controls ATTCP application updates for the 2016 Energy Standards. NLCAA can now train, certify, and recertify lighting acceptance test technicians (ATTs) and their employers under the 2016 Enegy Standards.

For more information, please visit: **http://energy.ca.gov/title24/attcp/**.

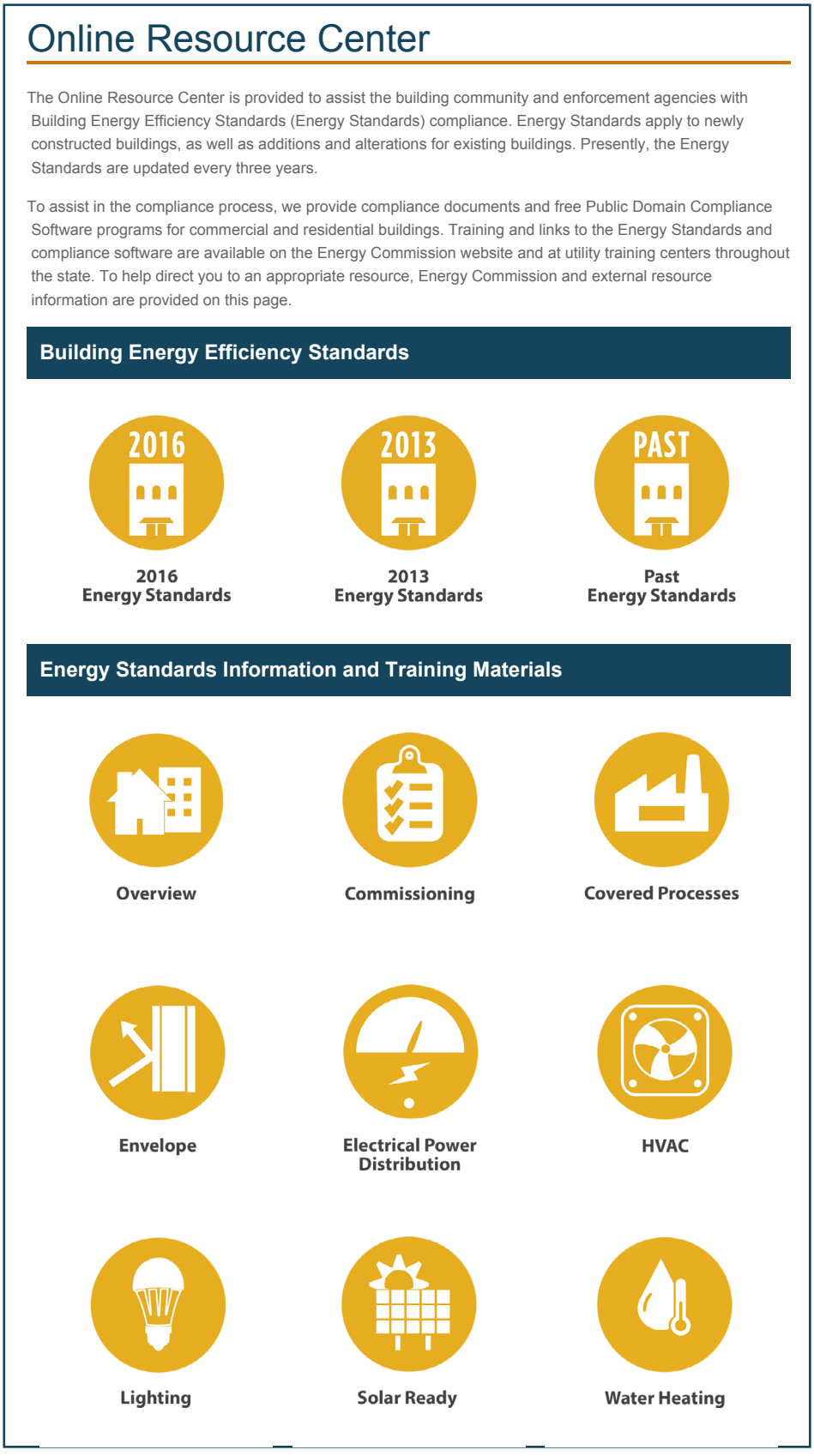

Figure 1 - Layout of the New Online Resource Center

2016 High Efficacy Requirements for Ceiling Recessed and Enclosed Luminaires

The 2016 Energy Standards require that all lighting in residential buildings, high-rise residential dwelling units, and hotel and motel guest rooms be high efficacy. This is a significant change from the 2013 Energy Standards which allows low efficacy light sources in some instances, provided additional controls are installed.

Classification of High Efficacy Light Sources

Under the 2016 Energy Standards, residential lighting can be classified as high efficacy through two methods which are presented in Table 1 below. Light sources listed in the left-hand column of Table 1 are automatically classified as high efficacy and may be installed without meeting any additional requirements. Light sources shown in the right-hand column of Table 1 must be certified as meeting the performance requirements in **Reference Joint Appendix JA8** before they can be installed.

Ceiling Recessed Downlights and Enclosed Luminaires

The 2016 Energy Standards also introduced new requirements for recessed downlight luminaires in ceilings and enclosed luminaires. All light sources installed in ceiling recessed downlight luminaires and **enclosed luminaires** must be JA8 certified. Additionally, light sources installed in ceiling recessed downlights and enclosed luminaires must pass the elevated temperature test to ensure that they work properly in these types of luminaires. This means that light sources that are automatically classified as high efficacy (left-hand column of Table 1), for instance pin-based CFLs, must be JA8 certified to be installed in ceiling recessed downlights and enclosed luminaires.

Controls for Luminaires with JA8 Certified Light Sources

Section 150.0(k)2K requires that all luminaires with JA8 certified light sources must be controlled by a dimmer or vacancy sensor. Because recessed downlight luminaires and enclosed luminaires are required to have JA8 certified light sources installed, they must also be controlled by a dimmer or vacancy sensor.

In summary, the 2016 Energy Standards require ALL light sources installed in residential buildings, high-rise residential dwelling units, and hotel and motel guest rooms to be high efficacy. Per Table 1, certain light sources are automatically classified as high efficacy, while others must be JA8 certified to be classified as high efficacy. All light sources, including light sources which are automatically classified as high efficacy, installed in ceiling recessed downlight luminaires and enclosed luminaires must be JA8 certified and pass the elevated temperature test. Additionally, all ceiling recessed downlights and enclosed luminaires must be controlled by a dimmer or vacancy sensor.

Table 1 - High Efficacy Light Sources

High Efficacy Light Sources	
No JA8 Certification Required	JA8 Certification Required
» Pin-based linear or compact fluorescent light sources using electronic ballasts » Pulse-start metal halide » High pressure sodium » GU-24 sockets containing light sources other than LEDs[a,b] » Luminaires with hardwired high frequency generator and induction lamp » Inseparable SSL luminaires that are installed outdoors » Inseparable SSL luminaires containing colored light sources that are installed to provide decorative lighting	» All light sources in ceiling recessed downlight[c] » All light sources in enclosed luminaires » GU-24 sockets containing LED light sources » Any light source not listed in this table

a. GU-24 sockets containing light sources such as compact fluorescent lamps and induction lamps.

b. California Title 20 **Section 1605.3(k)4** does not allow incandescent sources to have a GU-24 base.

c. Ceiling recessed downlight luminaires must not have screw base sockets regardless of the lamp type as described in **Section 150.0(k)1C**.

Deep-Dimming Fluorescent Lamp Ballast Efficiency Standards

The 2013 and 2016 Energy Standards require multi-level lighting controls for non-residential lighting systems. Fluorescent lighting systems can meet the multi-level lighting control requirements of **Section 130.1** by using deep-dimming fluorescent lamp ballasts. These ballasts allow lamps to be dimmed to or below 50 percent of full light output. Dimming ballasts can reduce energy consumption significantly by providing the ability to control the amount of light in the space based on occupant needs.

Deep-dimming fluorescent lamp ballasts manufactured on or after July 1, 2016, are regulated by the Appliance Efficiency Regulations (Title 20). These **new regulations** require deep-dimming fluorescent lamp ballasts to meet certain efficiency requirements and to be listed in the **Appliance Efficiency Database**. These regulations apply only to fluorescent lamp ballasts designed to operate the following fluorescent lamps:

- One to four T5 four-foot linear
- One to four T8 four-foot linear
- U-shape

Questions regarding the new efficiency requirements may be directed to the **Title 20 Call Center**.

Overlapping Requirements for Residential Hot Water Pipe Insulation

The 2016 Energy Standards and California Plumbing Code both have requirements for insulating residential domestic hot water pipes. These requirements differ slightly.

Section 1.1.7.3 of the California Building Code states,

> *"When the requirements of this code conflict with the requirements of any other part of the California Building Standards Code, Title 24, the most restrictive requirements shall prevail."*

Section 150.0(j)2A of the Energy Standards requires all hot water system piping, which meet the conditions below, to be insulated according to **TABLE 120.3-A**:

i. The first 5 feet (1.5 meters) of hot and cold water pipes from the storage tank

ii. All hot water piping with a nominal diameter of 3/4 inch (19 millimeter) or larger

iii. All piping associated with a domestic hot water recirculation system regardless of the pipe diameter

iv. Piping from the heating source to storage tank or between tanks

v. Piping buried below grade

vi. All hot water pipes from the heating source to the kitchen fixtures

Section 609.11 of the 2016 Plumbing Code states,

> *"Insulation of domestic hot water piping shall be in accordance with Section 609.11.1 and Section 609.11.2.*
>
> *"609.11.1 Insulation Requirements. Domestic hot water piping shall be insulated.*
>
> *"609.11.2 Pipe Insulation Wall Thickness. Hot water pipe insulation shall have a minimum wall thickness of not less than the diameter of the pipe for a pipe up to 2 inches (50mm) in diameter. Insulation wall thickness shall be not less than 2 inches (51 mm) for a pipe of 2 inches (50 mm) or more in diameter."*

New Mechanical ATTCP

On September 14, 2016, the Energy Commission approved the California State Pipe Trades Council (CSPTC) as a mechanical ATTCP.

This gives CSPTC the authority to train, certify, and oversee mechanical ATTs and their employers. CSPTC will train and certify ATTs to perform all 17 mechanical acceptance tests required in the 2013 Energy Standards.

For more information, please visit: **http://energy.ca.gov/title24/attcp/**.

ATTCP and HERS Reference Cards Now Available

The Energy Commission has just released **ATTCP** and **HERS** reference cards. These cards are designed to quickly identify when acceptance testing or HERS verification is required and how to find approved providers. A preview of the ATTCP and HERS cards are provided below in Figures 2 and 3, respectively.

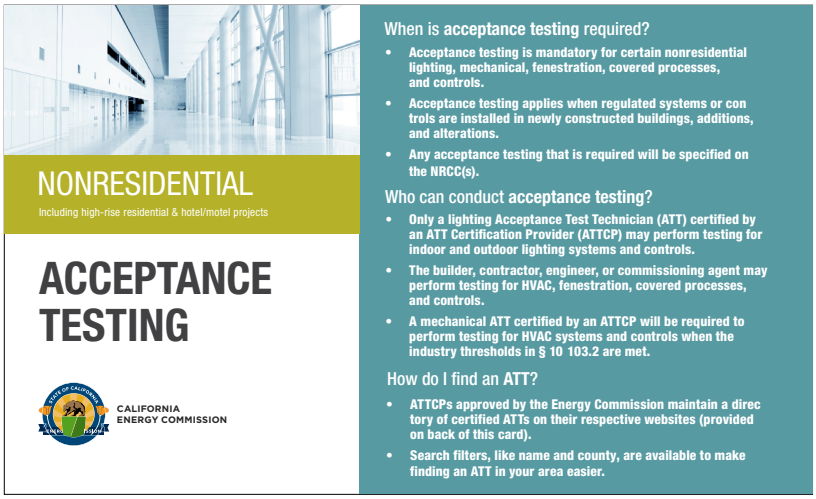

Figure 2 - ATTCP Reference Card Preview

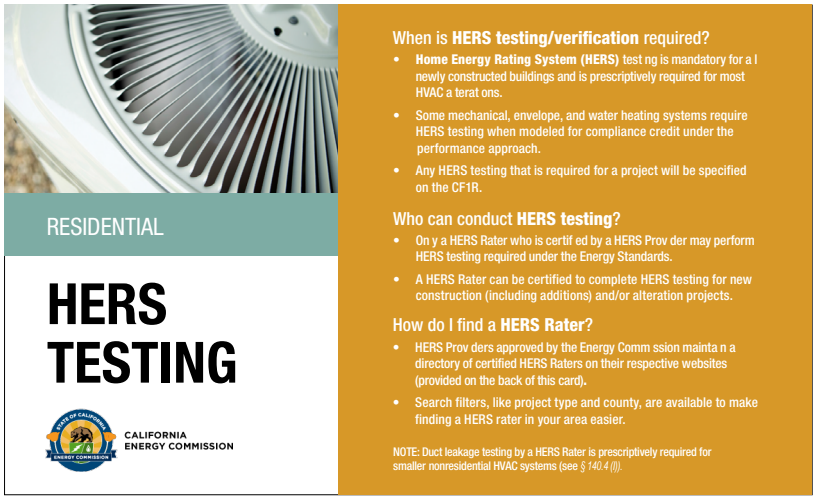

Figure 3 - HERS Reference Card Preview

Q&A

2016 Nonresidential Lighting Alterations

I have two rooms, each with 15 altered luminaires. The luminaires in each room will have new separate controls (e.g. occupancy sensor). Exception 4 to Section 141.0(b)2I states,

> **"Acceptance testing requirements of Section 130.4 are not required for alterations where lighting controls are added to control 20 or fewer luminaires."**

Since the controls will each be controlling 15 luminaires, is this project exempt from the acceptance testing requirements?

No. The 20 controlled-luminaire threshold is specific to the project. Since the controls are installed to control more than 20 luminaires for the project, the acceptance testing requirements are applicable.

2016 Residential Water Heating Options

It takes a long time for hot water to reach my master bathroom. To reduce the wait time for hot water, can I prescriptively install a second water heater closer to my master bathroom?

Yes. Per **Section 150.2(b)1Giid,** the Energy Commission used the performance compliance approach and determined that an additional natural gas or propane instantaneous water heater uses no more energy than the standard design system, and can be installed prescriptively. If an additional storage or electric instantaneous water heater is added, the performance compliance approach must be used. The information in the "Residential Water Heating Options" article in ***Blueprint*** **Issue 113** is still applicable to the 2016 Energy Standards.

For More Information

Home Energy Rating System:
http://www.energy.ca.gov/HERS/

Acceptance Test Technician Certification Provider Program:
http://www.energy.ca.gov/title24/attcp/

Approved Computer Compliance Programs:
http://www.energy.ca.gov/title24/2013standards/2013_computer_prog_list.html

The California Energy Commission welcomes your feedback on Blueprint. Please contact Andrea Bailey at:
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