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Introduction

This compliance manual is intended to help plans examiners, inspectors, owners, designers, builders, and energy consultants comply with and enforce California's 2025 Building Energy Efficiency Standards (Energy Code) for single-family residential buildings. The manual is written as a reference and instructional guide and can be helpful for anyone who is directly or indirectly involved in the design and construction of energy-efficient single-family residential buildings.

The compliance manual has ten chapters:

Chapter 1 introduces the Energy Code and discusses the application and scope of the standards for single-family residences.

Chapter 2 analyzes the compliance and enforcement process, including design and preparation of compliance documentation through field verification and diagnostic testing.

Chapter 3 details the building envelope.

Chapter 4 discusses heating, ventilation, and air-conditioning (HVAC) systems.

Chapter 5 outlines water-heating systems requirements, including the requirements for swimming pool systems.

Chapter 6 looks at requirements for hardwired interior lighting and for outdoor lighting permanently attached to the building.

Chapter 7 examines photovoltaic systems (PV), battery storage systems, and shared solar electric systems or community-shared battery system compliance option and solar-ready requirements for single-family residential buildings.

Chapter 8 outlines the performance approach to compliance.

Chapter 9 goes over additions, alterations, and repairs.

Chapter 10 covers the mandatory electric readiness requirements for mixed- fuel single-family buildings.

Related Documents

This compliance manual supplements four other related documents that are available from the California Energy Commission. These are:

- The *2025 Building Energy Efficiency Standards, Title 24, Part 1 and Part 6* (Energy Code). This compliance manual supplements, explains, and clarifies California's energy efficiency standards for buildings; it does not replace them. Readers should refer to a copy of the Energy Code while reading this manual, as well as a copy of the *2025 Reference Appendices*.
- The *2025 Reference Appendices*. The reference appendices have three main subsections: Reference Joint Appendices, Reference Residential Appendices, and Reference Nonresidential Appendices:

- The *2025 Reference Joint Appendices* contain information common to single-family residential, nonresidential, and multifamily buildings including, but not limited to, definitions, climate zone information, weather data, assembly properties, qualification requirements for high-efficacy light sources, compliance documentation registration procedures, qualification requirements for photovoltaic systems, and qualification requirements for battery storage systems.
    - The *2025 Reference Residential Appendices* contain information for single-family residential and low-rise multifamily buildings. The Reference Residential Appendices contain Energy Code Compliance (ECC) field verification and diagnostic testing procedures for HVAC equipment, air distribution ducts, and quality insulation installation.
    - The *2025 Reference Nonresidential Appendices* contain information for nonresidential and high-rise multifamily buildings. The reference nonresidential appendices contain ECC field verification and diagnostic testing procedures for HVAC equipment and air distribution ducts, acceptance testing procedures, and luminaire power default values.
- The *2025 Single-family Residential Alternative Calculation Method Reference Manual* lays out the technical rules for implementing the 2025 performance compliance path in software programs.

Material from related documents is referenced but not repeated in this compliance manual. If you are using the electronic version of this compliance manual, there are hyperlinks throughout the manual that will take you directly to referenced documents.

The Technical Chapters

Please refer to Chapter 1.2 of the *2022 Single-Family Residential Compliance Manual*.

Why California Needs Building Energy Efficiency

Standards

Please refer to Chapter 1.3 of the *2022 Single-Family Residential Compliance Manual*.

Energy Savings

Reducing energy use benefits everyone. Homeowners save money, Californians have a more secure and healthy economy, the environment is less negatively impacted, and the state electrical system can operate in a more stable manner. The 2025 Energy Code (for residential and nonresidential buildings) is expected to reduce the growth in electricity use and natural gas use.

Electricity Reliability and Demand

Buildings are a significant source of electricity demand. Following previous California electricity crises and blackouts, the Energy Commission has placed greater emphasis on demand reduction. The Energy Commission has learned that the electric distribution network is fragile, and system overloads caused by excessive demand from buildings can create unstable

conditions. Moreover, blackouts can seriously disrupt business and cost the economy billions of dollars.

Comfort

Please refer to Chapter 1.3.3 of the *2022 Single-Family Residential Compliance Manual*.

Economics

Please refer to Chapter 1.3.4 of the *2022 Single-Family Residential Compliance Manual*.

Environment

Please refer to Chapter 1.3.5 of the *2022 Single-Family Residential Compliance Manual*.

Global Warming

Please refer to Chapter 1.3.6 of the *2022 Single-Family Residential Compliance Manual*.

Building Decarbonization

California has nearly 14 million homes and 7.5 million square feet of commercial buildings. These buildings produce a quarter of the state's greenhouse gas (GHG) emissions, making homes and businesses a major factor in climate change. Reducing these emissions, also referred to as building decarbonization, is a key part of California's climate strategy. Of the many tools in the state's building decarbonization toolbox, the decarbonizing co-benefits of the California Energy Code stand out as a proven solution of significance.

The Warren-Alquist Act

Please refer to Chapter 1.3.8 of the *2022 Single-Family Residential Compliance Manual*.

What's New for 2025

The most significant change in the 2025 Building Energy Efficiency Standards affecting single-family residential buildings is the change to a single fuel baseline with heat pump being prescriptively required for both water heating and space heating.

Summary of Changes for Residential Buildings Include:

Mandatory Requirements:

- Heat pump water heaters installed with inlet air from outside must have backup heat if compressor cutout temperature is above or equal to the local Heating Winter Median of Extremes (Section 110.3(c)7A).
- Ventilation is required when installing a heat pump water heater (Section 110.3(c)7B).
- Pool- and/or spa-heating systems must be sized appropriately in newly constructed single-family buildings with heated swimming pools and spas (Section 110.4(c)).
- Heat pump pool heaters with supplementary heaters shall have controls installed to ensure that the supplementary heater does not operate when the heating load can be met by the heat pump alone (Section 110.4(d)).

- Exception to mandatory roof deck insulation in newly constructed attic systems in Climate Zones 4 and 8–16 to meet an area-weighted average U-factor no greater than 0.184 (Section 150.0(a)1), if the space-conditioning system is a ductless systems or for space-conditioning duct systems buried within insulation in an attic that complies using Section 150.1(b) and is verified according to RA 3.1.4.1.
- Increased mandatory required minimum wall insulation from R-13 to R-15 (0.095 U-factor) for 2 x 4 wood framed wall assemblies, and R-20 to R-21 (0.069 U-factor) for 2 x 6 assemblies (Section 150.0(c)).
- Clarifies that *block loads* (the total load for all rooms combined that are served by the central equipment) may be used for the purpose of system sizing for additions (Section 150.0(h)1).
- Provides guidance on how to use authorized load calculations in system sizing and selection. Specifically, states that heat pump heating capacity must meet minimum requirements from the California Building Code without including supplementary heating capacity; clarifies that there is no limit on minimum cooling or maximum heating capacity, and furnace heating capacity is based on ACCA Manual S-2023, Table N2.5 (Section 150.0(h)5).
- Establishes defrost requirements. Specifically, if a heat pump is equipped with a installer-adjustable defrost delay timer, the delay timer shall be set to greater than or equal to 90 minutes. This control configuration shall be tested by the installer and certified on the CF2R. Exceptions include homes in Climate Zones 6 and 7, and homes with conditioned floor area of 500 square feet or less in Climate Zones 3, 5–10, and 15 (Section 150.0(h)6).
- Requires that heat pump supplementary heating (electric resistance or gas) shall operate only above an outdoor temperature of 35°F during defrost or when the user selects emergency operation. This control configuration shall be tested by the installer and certified on the CF2R. There are exceptions for room air-conditioner heat pumps, buildings in Climate Zones 7 and 15, and buildings with a conditioned floor area less than 500 square feet (Section 150.0(h)7).
- Requires that electric resistance supplementary heat can have a capacity no larger than the heat pump nominal cooling capacity (at 95°F ambient conditions) multiplied by 2.7 kilowatts (kW) per ton, rounded up to the closest kW (Section 150.0(h)8).
- Requires that variable- or multispeed systems controlled by third-party thermostats shall be capable of responding to heating and cooling loads by modulating system compressor speed and meet thermostat requirements in Section 150.0(i)2. This control configuration shall be tested by the installer and certified on the CF2R (Section 150.0(h)9).
- Requires that thermostats controlling heat pumps with supplementary heat (electric resistance or gas) shall receive outdoor air temperature from an outdoor air temperature sensor or from an internet weather service, display the outdoor temperature, have an indicator to notify when supplementary heat or emergency heat is in use, and lock out supplementary heat when the outdoor temperature is above 35°F (alone or in conjunction with heat pump operation). This control configuration shall be tested by the installer and certified on the CF2R. There are exceptions for room air-conditioner heat pumps (Section 150.0(i)).

- Allows ducts in unvented attics to be insulated to R-4.2, less than the mandatory minimum of R-6, provided certain other requirements are met (Section 150.0(m)1Bi).
- Allows multispeed or variable-speed compressor systems with controls that vary fan speed based on the number of zones to conditioning may demonstrate compliance with airflow and fan efficacy requirements of 150.0(m)13C by operating the system at maximum compressor capacity and system fan speed, with all zones calling for conditioning (Section 150.0(m)13).
- Revises to new whole dwelling unit mechanical ventilation rates for detached and attached single-family dwellings (Section 150.0(o)1C). The revision includes accessibility requirements to facilitate servicing balanced and supply-only ventilation systems including accessibility of indoor air quality (IAQ) filters and heat recovery ventilation/energy recovery ventilator (HRV/ERV) cores, IAQ System components, and outdoor air intake location, as well as outdoor air intake design (Section 150.0(o)1Civ).
- Mandatory minimum U-factor for fenestration, including skylights, decreased to a weighted average U-factor of 0.40 (Section 150.0(q)).
- Fenestration installed in buildings located in fire hazard severity zones or wildland-urban interface (WUI) fire areas as designated by the local enforcement agency, is excepted from mandatory fenestration requirements (Section 150.0(q)).
- The battery energy storage system ready requirements have been updated to apply only for newly constructed single-family buildings that have a minimum 125 amp service panel, and an exception was added for single-family buildings that have already installed battery energy storage systems (Section 150.0(s)).

Prescriptive Compliance:

- The prescriptive maximum U-factor requirement for window assemblies in most homes was reduced to 0.27 from 0.30 in Climate Zones 1 through 5, 11 through 14, and 16; all other climate zones remain at 0.30 U-factor. This change applies to homes 500 square feet or less except in Climate Zone 5, where the prescriptive maximum U-factor for homes 500 square feet or less remains at 0.30 (Section 150.1(c)3A).
- A new alternative prescriptive compliance pathway under Option C of Table 150.1-A, for cathedral ceilings in single-family new construction. Cathedral ceilings will require a minimum R-value of 38 across all climate zones (Section 150.1(c)1A).
- Under the prescriptive compliance approach, in all climate zones, the heating equipment is required to be a heat pump or shall meet the performance compliance requirements of Section 150.1(b)1 (Section 150.1(c)6).
- Refrigerant charge verification is now required for heat pumps in all climate zones (Section 150.1(c)7A, Table 150.1-A).
- Fault indicator displays have been removed as an available method for refrigerant charge verification (Section 150.1(c)7A).

- Introduce solar access roof area (SARA) multipliers for steep-sloped and low-sloped roofs that are used to determine the PV system size in kW for a given square foot area of usable SARA roof space (Section 150.1(c)14).

Performance Compliance:

- Long-term system cost (LSC) and source energy metrics used for compliance through the performance approach (Section 150.1(b)1).

Additions and Alterations:

- Mandatory requirement for heat pump water heaters installed with inlet air from outside must have backup heat if the compressor cutout temperature is above or equal to the local heating winter median of extremes (Section 110.3(c)7A).
- Mandatory requirement for ventilation when installing a heat pump water heater (Section 110.3(c)7B).
- For additions greater than 700 square feet, the prescriptive maximum U-factor requirement for window assemblies was reduced to 0.27 from 0.30 in Climate Zones 1–5 , 11–14, and 16; the prescriptive maximum U-factor in Climate Zones 6–10 and 15 remains at 0.30. For alterations that add fenestration area, the maximum solar heat gain coefficient (SHGC) value in Climate Zone 15 is 0.23 (Section 150.2(a)1A, Table 150.1-A).
- For additions 700 square feet or less, Option C for roof insulation provides a new alternative prescriptive pathway for cathedral ceilings. Cathedral ceiling will require a minimum R-value of 38 for all climate zones (Section 150.2(a)1B, Table 150.1-A).
- In addition to the requirements in Section 150.0(h) for additions, in situations where airflow is NOT field verified to be at least 350 cubic feet per minute (cfm)/ton, maximum capacity limits are provided in Tables 150.2-A and B that depend on the relative sizes of the calculated heating design load (HL) and cooling design load (CL), the type of space conditioning system, and the duct sizing (Section 150.2(a)1E). There is an exception for ductless space-conditioning systems, as well as variable-speed and multispeed systems.
- For additions, the envelope leakage specified in the space-conditioning load calculation shall be no greater than the values shown in Table 150.2-C ("average" for many load calculation software tools). If leakage is established through field verification and diagnostic testing, the tested envelope leakage value may be used in the load calculations (Section 150.2(a)1E).
- The energy budget for additions is expressed in terms of LSC (Section 150.2(a)2).
- For altered space-conditioning systems refrigerant charge verification is required for heat pumps in all climate zones, and for air conditioners in Climate Zones 2 and 8–15 (Section 150.2(b)1F).
- Fault indicator displays have been removed as an available method for refrigerant charge verification (Section 150.2(b)1F).

Scope and Application

Building Types

Though the Energy Code applies to nonresidential and residential buildings, this compliance manual addresses only the requirements for single-family residential buildings. Companion compliance manuals address the requirements for nonresidential buildings, including hotels, motels, and multifamily buildings.

Mixed Low-Rise Residential and Nonresidential Occupancies

Reference: Section 100.0(f)

When a building includes both low-rise residential and nonresidential occupancies, the requirements are different depending upon the percentages of the conditioned floor area (CFA) that is occupied by each occupancy type.

Minor Occupancy (Exception 1 to Section 100.0(f)).

When a residential occupancy occurs in the same building as a nonresidential occupancy, and if one of the occupancies is less than 20 percent of the total conditioned floor area, the smaller occupancy is considered a "minor" occupancy. Under this scenario, optionally, the entire building may be treated as if it is the major occupancy for envelope, HVAC, and water heating. Lighting requirements in Section 140.6 through Section 140.8 or Section 150.0(k) must be met separately for each occupancy. The mandatory requirements applicable to the minor occupancy, if different from the major occupancy, would still apply.

Mixed Occupancy

When residential occupancy is mixed with a nonresidential occupancy, and if neither occupancy is less than 20 percent of the total conditioned floor area, these occupancies fall under different sets of standards and must be considered separately. Two compliance submittals must be prepared, each using the calculations and forms of the respective standards. Separate compliance for each occupancy, to the respective standards, is an option when one of the occupancies is a minor occupancy, as discussed in the paragraph above.

The 2025 Energy Code definition of a *habitable story* is a story that contains habitable space and that has at least 50 percent of the volume above grade. *Habitable space* is space in a building for living, sleeping, eating, or cooking, excluding bathrooms, toilets, hallways, storage areas, closets, utility rooms and similar areas. Mezzanines are not counted as separate habitable stories, nor are minor conditioned spaces, such as an enclosed entry stair that leads to an apartment or dwelling unit on the next floor (Section 100.1(b)).

Single-Family Building Types Covered by the Energy Code

All single-family dwellings of any number of stories (Group R-3). These may include accessory dwelling units, townhouses and buildings of an accessory character (Group U) e.g. private garages.

All duplex (two-dwelling) buildings of any number of stories (Group R-3).

Residential facilities licensed by a governmental agency for a residentially based 24-hour care facility providing accommodations for six or fewer clients of any age (Group R-3.1).

Additions and alterations to the above buildings.

Explanation of Terms

The term building type refers to the classification of buildings defined by the CBC and applicable to the requirements of the Building Energy Efficiency Standards. This manual is concerned with the Energy Code that applies to all single-family residential buildings described in Single-Family Building Types Covered by the Energy Code. Multifamily residential buildings are addressed in the Energy Commission's *2025 Multifamily Compliance Manual*.

A *multifamily building* is any of the following:

- A building of Occupancy Group R-2, other than a hotel/motel building or timeshare property
- A building of Occupancy Group R-3 that is a nontransient congregate residence, other than boarding houses of more than 6 guests and alcohol or drug abuse recovery homes of more than 6 guests
- A building of Occupancy Group R-4

A *newly constructed* building is a building that has never been used or occupied for any purpose.

An addition increases the conditioned floor area and volume of an existing building, which can be from new construction or installation of space conditioning for an existing unconditioned space. See Chapter 9 for more information on energy compliance of additions.

An *existing building* is "... a building erected prior to the date of adoption of [the current] code, or one for which a legal building permit has been issued." (CBC, Part 2)

Building Orientation

Reference: Section 100.1(b)

Building orientation can affect the energy use of a building, particularly in cooling-dominated climate zones with a high amount of west-facing glass. When using the prescriptive approach, compliance with the Energy Code, a building's orientation must be determined in order to ensure compliance with the appropriate orientation dependent requirements When using the performance approach, the buildings orientation input is based on the actual azimuth of the front of the building.

"East-facing is oriented to within 45 degrees of true east, including 45°0'0" south of east (SE), but excluding 45°0'0" north of east (NE)." (Section 100.1)

"North-facing is oriented to within 45 degrees of true north, including 45°0'0" east of north (NE), but excluding 45°0'0" west of north (NW)." (Section 100.1)

"South-facing is oriented to within 45 degrees of true south, including 45°0'0" west of south (SW), but excluding 45°0'0" east of south (SE)." (Section 100.1)

"West-facing is oriented to within 45 degrees of true west, including 45°0'0" due north of west (NW) but excluding 45°0'0" south of west (SW)." (Section 100.1)

Historical Buildings

Please refer to Chapter 1.5.4 of the *2022 Single-Family Residential Compliance Manual*.

Buildings Not Required to Meet Prescriptive and Performance Standards

Please refer to Chapter 1.5.5 of the *2022 Single-Family Residential Compliance Manual*.

Building Systems Covered

The single-family residential standards affect the design of the building envelope, the HVAC system, the water-heating system, solar PV and battery energy storage systems, and the lighting system. The Energy Code does not regulate the efficiency requirements of residential appliances, such as elevators or dumbwaiters, or portable lighting systems that are plugged into a wall outlet. Residential appliances used for space conditioning, ventilation, and water heating are required to meet minimum efficiency requirements (Appliance Efficiency Regulations), which are federally regulated. Hardwired lighting, which includes lighting that is a permanent part of the building, is also regulated by the Energy Code.

Additions, Alterations, and Repairs

Reference: Section 100.1(b), Section 150.2(a), Section 150.2(b)

Additions, alterations, and repairs are common construction projects for California homeowners. The Energy Code applies to additions and alterations, but not to repairs. See Chapter 9 for details.

As described in the Scope section, an addition increases the conditioned floor area and volume of an existing building, which can be from new construction or installation of space conditioning for an existing unconditioned space.

Newly conditioned space is any space being converted from unconditioned to directly conditioned or indirectly conditioned space. Newly conditioned space must comply with the requirements for an addition.

Chapter 9 includes detailed guidance on showing compliance for accessory dwelling units and converting an existing unconditioned space to conditioned space.

Alterations that are not additions are changes to the water-heating system, space-conditioning system, lighting system, electrical power distribution system or envelope of a building.

Repairs are the reconstruction or renewal of any part of an existing building for maintenance purposes and are not under the scope of the standards. Replacement of any component systems (such as reroofing) or equipment for which there are requirements in the Energy Code is considered an alteration and not a repair.

Example 1-1

Question

The Energy Code does not specify whether buildings damaged by natural disasters can be reconstructed to the original energy performance specifications. What requirements apply under these circumstances?

Answer

Buildings destroyed or damaged by natural disasters must comply with the Energy Code requirements in effect when the builder or owner applies for a permit for those portions of the building that are being rebuilt.

Example 1-2

Question

Does the Energy Code apply to an addition to a manufactured ("mobile") home?

Figure 1-1: Mobile Home

Source: California Energy Commission (Brian Vahey)

Answer

No. Title 25, not Title 24, governs manufactured homes, including additions to the unit. Jurisdiction in a mobile home park falls under the authority of the Department of Housing and Community Development. Jurisdiction of a mobile home on private property may fall under the authority of the local building department.

Example 1-3

Question

Does a four-story townhouse need to comply with the single-family residential standards or the multifamily residential standards?

Answer

It depends on how the townhouse is classified by the enforcement agency. If the enforcement agency classifies the townhouse as a Group R-3 occupancy, the single-family residential standards will apply. If the townhouse is classified by the enforcement agency as another Group R occupancy (i.e., Group R-2) and all four stories are habitable, the multifamily residential standards will apply. If the enforcement agency classifies the townhouse as a group R-2 occupancy but three or fewer stories are habitable, the single-family residential standards will apply.

Example 1-4

Question

A 2,100 ft² manager's residence is being constructed as part of a new 14,000 ft² conditioned warehouse building. Which Energy Code applies?

Answer

The whole building can comply with the nonresidential standards, and the residential unit is not required to comply separately since it is a subordinate occupancy comprising less than 20 percent of the total conditioned floor area. However, the residential dwelling unit must meet all single-family residential mandatory requirements, as well as the lighting and water-heating requirements.

Example 1-5

Question

Assume the same scenario as in the previous example, except that the dwelling unit is new, and the remainder of the building is existing. Do the residential standards apply?

Answer

Yes. Since 100 percent of the addition being permitted is a single-family residential occupancy, compliance under the residential standards is required.

Example 1-6

Question

A residence is being moved to a different location. What are the applicable compliance requirements?

Answer

Because this is an existing conditioned space, the requirements applicable to alterations would apply to any alterations being made. The building does not need to show compliance with the current Energy Code applicable to new buildings or additions.

Example 1-7

Question

A previously conditioned retail space is remodeled to become a residential dwelling. What are the applicable compliance requirements?

Answer

The remodeled dwelling is treated as if it were previously a residential occupancy. In this case, the rules that apply to residential alterations are applied.

Example 1-8

Question

A subdivision of detached homes includes several unit types, each of which may be constructed in any orientation. What are the applicable compliance requirements?

Answer

The single-family residential standards are applied to each building type. All four cardinal orientations may be shown to comply, or each unit in the planned orientation must comply.

Compliance Approaches and Mandatory Requirements

Please refer to Chapter 1.6 of the *2022 Single-Family Residential Compliance Manual.*

Approaches

The prescriptive approach, composed of a climate zone-dependent prescriptive package, is less flexible but simpler than the performance approach. Each energy component of the proposed building must meet a prescribed minimum efficiency. The prescriptive approach offers relatively little design flexibility but is easy to use. There is some flexibility for building envelope components. For example, if a portion of a wall does not meet the prescriptive insulation requirement, an area-weighted average of all walls can be used to meet the prescriptive requirement.

The performance approach is more complicated but offers considerable design flexibility. The performance approach uses an approved software program to model a proposed building and compare it to a calculated energy budget. Performance compliance is based on the building's envelope, HVAC systems, DHW systems, and solar PV system efficiencies. This approach is popular with builders because of the flexibility, and it provides a way to find the most cost-effective solution for complying with the Energy Code.

For additions and alterations, see Chapter 9 for details of compliance approaches that are available.

Mandatory Requirements

Reference: Section 150.0

With either the prescriptive or performance approaches, applicable mandatory requirements must always be met or exceeded. Some mandatory requirements deal with infiltration control and lighting, others require minimum insulation levels or equipment efficiencies.

Minimum mandatory levels are sometimes superseded by more stringent prescriptive or performance approach requirements. For example, if mandatory requirements specify R-22 ceiling insulation and the prescriptive approach is used, then R-38 ceiling insulation (depending on climate zone) must be installed.

Conversely, the mandatory requirements may be of a higher efficiency than permitted under the performance approach; in these instances, the higher mandatory levels must be installed. For example, a building may comply using the performance approach by modeling only R-7 insulation in a raised floor, but R-19 insulation must be installed because that is the mandatory minimum.

Prescriptive Approach

Reference: Section 150.1(c)

As described above, the prescriptive approach is a set of predefined performance levels for various building components. The prescriptive requirements are represented in Table 150.1-A for newly constructed single-family buildings. Each component shall meet or exceed the minimum efficiency level specified in Table 150.1-A and related footnotes in the Energy Code. In some climate zones, these prescriptive requirements specify that many cooling system types are ECC-tested to verify that they have the correct refrigerant charge.

Performance Approach

Reference: Section 150.1(b)

The performance approach described above requires that the building comply with the hourly source energy, efficiency long-term system cost (efficiency LSC), total long-term system cost (total LSC), and peak cooling. These metrics are detailed in the *2025 Single-Family Residential Buildings Alternative Calculation Method Reference Manual.*

LSC shall be calculated for the proposed building and compared to the standard LSC budget. LSC is the "currency" for the performance approach. LSC not only considers the type of energy that is used (electricity, gas, or propane), but when it is used. Energy saved during periods when California is likely to have a statewide system peak is worth more than energy saved at times when supply exceeds demand.

Reference Joint Appendix JA3 has more information on LSC.

See Chapter 8 of this manual for more information on the performance method.

Climate Zones

Please refer to Chapter 1.7 of the *2022 Single-Family Residential Compliance Manual*.

Building Location Climatic Data

Building location climatic data refer to specific outdoor design conditions used in calculating heating and cooling loads. These data typically include the warmest and coolest outdoor temperatures that a building is likely to experience in an average year in a particular location.

For heating, the minimum outdoor design temperature is the winter median of extremes. A higher design temperature is permitted but not a lower value. For cooling, the outdoor design temperature must be the 1.0 percent summer design dry bulb and the 1.0 percent wet bulb.

If a building location is not listed, the local enforcement agency may determine the location for which data are available that is closest in its design characteristics to the actual building site.

Conditioned Floor Area

Please refer to Chapter 1.8 of the *2022 Single-Family Residential Compliance Manual*.

Where to Get Help

Please refer to Chapter 1.9 of the *2022 Single-Family Residential Compliance Manual*.

Energy Commission Publications and Support Telephone Hotline

If the information contained in the Energy Code or this compliance manual are not sufficient to answer a specific question concerning compliance or enforcement, technical assistance is available from the Energy Code Hotline.

You can reach the Energy Code Hotline on weekdays from 8 a.m.–noon and 1 p.m.–4:30 p.m.:

- https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/energy-code-hotline-submission
- (800) 772-3300
- (916) 654-5106

Publications

Publications including the *2025 Building Energy Efficiency Standards*, the *2025 Reference Appendices*, the *2025 Residential ACM Reference Manuals*, and others are available from the Energy Commission's website at http://www.energy.ca.gov/title24. Paper copies may also be ordered from:

Publications Unit

California Energy Commission

715 P Street, MS-5

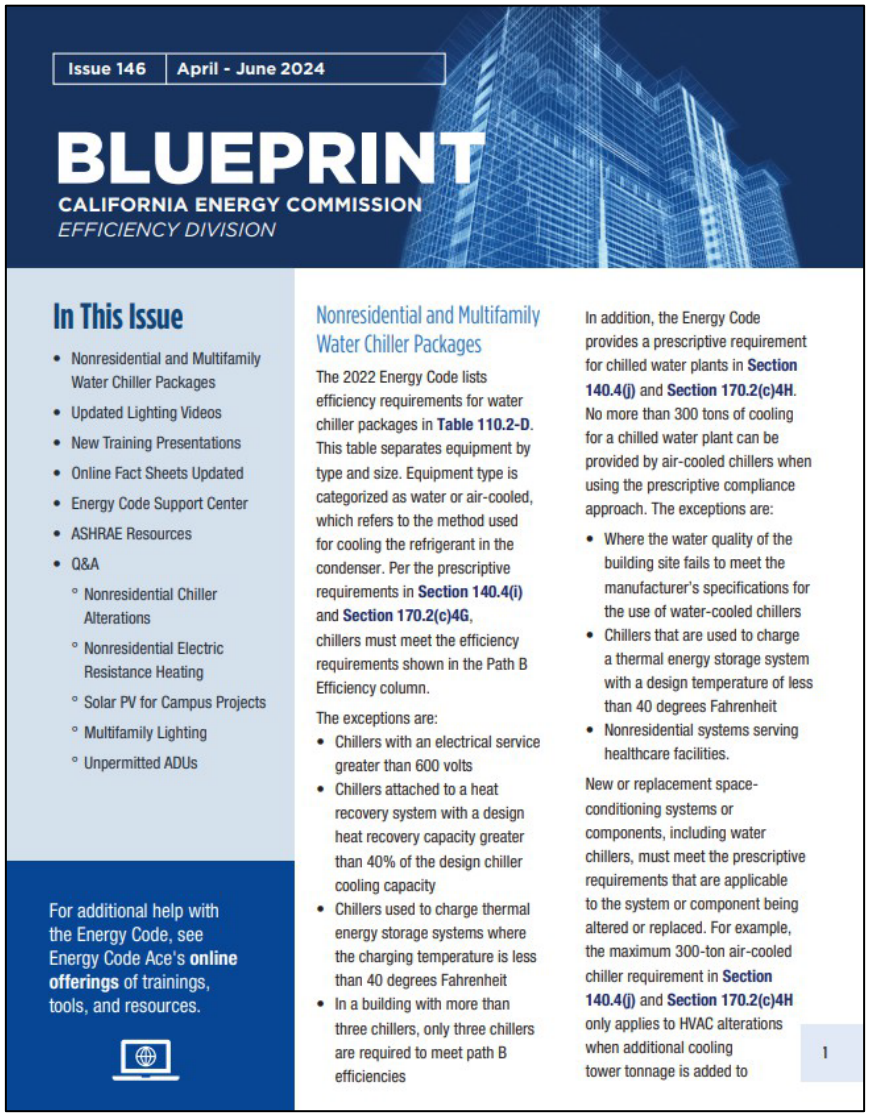
Sacramento, CA 95814

(916) 654-5200

Blueprint

The Energy Commission publishes the *Blueprint*, a newsletter that answers questions and addresses issues related to enforcement and compliance. The *Blueprint* also provides updated information on technical assistance and building energy modeling compliance software and lists training opportunities offered throughout the state. The *Blueprint* is available online at https://www.energy.ca.gov/newsroom/blueprint-newsletter.

Figure 1-2: Energy Commission Blueprint Newsletter



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BLUEPRINT

CALIFORNIA ENERGY COMMISSION

EFFICIENCY DIVISION

In This Issue

- Nonresidential and Multifamily Water Chiller Packages
- Updated Lighting Videos
- New Training Presentations
- Online Fact Sheets Updated
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  - Nonresidential Chiller Alterations
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  - Multifamily Lighting
  - Unpermitted ADUs

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

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

1

Source: California Energy Commission

Appliance Standards

Appliances, as defined by the CEC, include everything from dishwashers and refrigerators to air conditioners and boilers. The performance of some appliances, such as air conditioners, water heaters, and furnaces, is critical to the *Building Energy Efficiency Standards.* The energy efficiency of other appliances, such as refrigerators, dishwashers, and clothes dryers, is important to homeowners but does not affect the *Building Energy Efficiency Standards* since these are considered home furnishings. The CEC has a comprehensive list of standards that affect the performance of many appliances. Appliance Standards information is available from the CEC website at https://www.energy.ca.gov/rules-and-regulations/appliance-efficiency-regulations-title-20.

Appliance Directories

The CEC publishes information on the energy efficiency of appliances. CEC-approved directories can be used to determine if appliances meet the mandatory requirements or the prescriptive requirements or both. Data may also be used in performance calculations. The

Energy Code Hotline can verify certification of appliances and provide information on appropriate directories.

The complete appliance database (including manufacturer, brand codes, rated efficiencies, and so forth) can be searched from the Energy Commission's website at

https://www.energy.ca.gov/programs-and-topics/programs/appliance-efficiency-program-outreach-and-education/modernized.

Directory of Certified Insulation Materials

Manufacturers of insulation materials certified for sale in California are listed in the Department of Consumer Affairs' *Consumer Guide and Directory of Certified Insulation Material*. Each building department receives a copy of this directory. If an insulation product is not listed in the directory, or if you want to purchase a directory, please contact the Department of Consumer Affairs, Bureau of Household Goods and Services (BHGS), at (916) 999-2041 or visit https://bhgs.dca.ca.gov/.

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Please refer to Chapter 1.9.3 of the *2022 Single-Family Residential Compliance Manual*.

Online Videos

Please refer to Chapter 1.9.4 of the *2022 Single-Family Residential Compliance Manual*.

Energy Code Compliance (ECC) Program

To comply with the Energy Code, some projects require third-party field verification and diagnostic testing of energy-efficient systems or devices. ECC-Raters are expected to be hired by the builder or building owner to perform this work. Installing contractors may hire the ECC-Rater for HVAC changeouts only if the homeowner authorizes the installing contractor to do so. The CEC approves ECC-Providers to train, certify, and monitor ECC-Raters.

For a list of ECC-Providers, please visit the Energy Code Compliance Program web page at https://www.energy.ca.gov/programs-and-topics/programs/energy-code-compliance-program. To find an ECC-Rater, browse to the ECC-Providers' websites to find listings of certified ECC-Raters and ECC-Rating Companies.