



Overview

The 2016 update to the Residential Building Energy Efficiency Standards (Energy Standards) requires new and altered homes to become more efficient in several ways to create energy and environmental savings for Californians. See Figure 1 below for building systems that include updates under the new 2016 Energy Standards.

The 2016 Energy Standards have been adopted, and once approved, will be implemented for projects permitted on or after January 1, 2017. For more detailed information, see the related California Energy Commission (Energy Commission) FAQ sheet.



Figure 1: Title 24, Part 6 2016 Update Infographic by Energy Commission

Statewide Savings

The incremental changes to California's energy code mean big savings across the state for ratepayers. Per the Energy Commission, new residential requirements for the 2016 code cycle mean real savings for homeowners—around \$7,400 over a 30 year mortgage. A single family home that meets the 2016 standards could see 28% more energy savings in regulated loads than those built under the 2013 Energy Standards. See the [Adoption Hearing Presentation](#) for more 2016 Energy Standards energy impacts.

California's Energy Goals

California's Energy Efficiency Strategic Plan describes energy efficiency as the "least cost, most reliable, and most environmentally sensitive resource, and minimizes our contribution to climate change."

The Strategic Plan goes on to outline four "Big Bold Strategies" to guide the market transformation necessary to meet the State's energy goals. A short description of the "Big Bold Strategies" and overview of the Strategic Plan is included in a summary [Fact Sheet](#).

Energy codes and standards is one of six themes identified in the Energy Efficiency Strategic Plan to achieve the Big Bold Strategy related to residential construction. The Strategic Plan describes the role of codes and standards as:

"Adopt aggressive and progressive minimum energy codes and standards for buildings and plug loads, effective code compliance and enforcement, and parallel, tiered voluntary energy efficiency standards that pull the market along and set a higher bar for subsequent standards."

The updates made to the Energy Standards described in this fact sheet are meant to take action on the codes and standards theme outlined in the Strategic Plan.

Envelope Highlights

Mandatory Measures §150.0

There are several new thresholds for mandatory envelope requirements including:

- Ceiling/Roof insulation maximum = 0.043 U-factor (R-22 wood framing)
- Non-framed (mass) wall maximum = 0.102 U-factor – Equivalency to R-13 wood framing
- Maximum fenestration U-factor = 0.58 (same as 2013)
 - New exception allows for 30 sqft for dual glazed greenhouse windows
- Doors (including pet doors) must meet maximum 0.3 cfm/ft² air leakage

Prescriptive High Performance Walls §150.1

In Climate Zones 1-5 & 8-16, above grade framed wall assemblies must not exceed a maximum U-factor of 0.051:

- 2x6 @ 16" OC framing—R19 cavity + R5 continuous
- 2x4 @ 16" OC framing—R15 cavity + R8 continuous

In Climate Zones 6 & 7, the maximum U-Factor is 0.065

Prescriptive High Performance Attics §150.1

There are three options that may be used to comply:

- **Option A:** Ducts and air handler may be located in the attic
 - Install attic radiant barrier (Zones 2-15)
 - Install R-38 insulation at ceiling (R-30 in zones 3 & 5-7)
 - Install continuous roof deck insulation (Zones 4 & 8-16)
 - R-6 with air space above insulation/ R-8 with no space
- **Option B:** Ducts and air handler may be located in the attic
 - Install attic radiant barrier (Zones 2,3 & 5-7)
 - Install R-38 insulation at ceiling (R-30 in Zones 3 & 5-7)
 - Install below roof deck insulation (at rafter) (Zones 4 & 8-16)
 - R-13 with air space above insulation/ R-18 with no space
- **Option C:** Ducts and air handler must be located in conditioned space
 - Install attic radiant barrier (Zones 2-15)
 - Install R-38 insulation at ceiling (R-30 in Zones 3 & 5-7)

Prescriptive Additions §150.2

There are several options that allow for extensions of existing wood-framed walls to retain the same dimensions.

- Install R-15 in 2x4 framing
- Install R-19 in a 2x6 framing

Mechanical Highlights

Updates were made to both mandatory and prescriptive HVAC requirements under the 2016 Standards:

Mandatory Measures §150.0(m)

- All ducts in conditioned spaces must include R-4.2 insulation.
- Duct leakage requirement has been reduced to 5% maximum for single family homes.

Prescriptive Measures §150.1

- High performance attics with ducts in attic (options A and B)
 - R-8 duct insulation in Zones 1-2, 4, 8-16
 - R-6 duct insulation in Zones 3, and 5-7
- High performance attics with ducts in conditioned space (option C)
 - R-6 in all zones
- Whole house fans must supply 1.5 cfm/sf (reduced from 2 cfm/sf). Attic vent area also reduced to 1 sf/ 750 cfm of airflow.

Domestic Hot Water Highlights

Increased Prescriptive Efficiency for Water Heaters (3 options) §150.1(c)8

- Tankless (gas or propane): minimum energy factor of 0.82
- Tank ≤ 55 gal (gas or propane): minimum energy factor of 0.60. Additional HERS verification: HERS verified Quality Insulation Installation (QII) and either HERS verified compact hot water distribution system or HERS verified DHW pipe insulation required.
- Tank > 55 gal (gas or propane): minimum energy factor of 0.76. Additional HERS verification: HERS verified compact hot water distribution system or HERS verified DHW pipe insulation required.

Mandatory Isolation Valves §110.3(c)7

- Instantaneous water heaters with an input rating of 6.8kBTU/hr (2 kW) or greater need an isolation valve on cold water supply and hot water leaving water heater.
- Each valve needs a hose bibb or other fitting allowing for flushing the water heater when the valves are closed.

Mandatory Water Heater Pipe Insulation §150.2(b)1G

- For water heater replacements, install piping insulation per mandatory requirements. Insulation for existing accessible piping must meet the requirements of Sections 150.0(j)2Ai, iii and iv.

Onsite Renewable Systems Highlights

The compliance credit for installing PV systems is only available if the project meets the following conditions:

- The Performance Approach is used
- The project is in Climate Zones 1-5, 8-16
- The system is ≥ 2 kWdc* for Single Family
- The system is ≥ 1 kWdc* for Multifamily
- The amount of credit will depend upon the Climate Zone and the Conditioned Floor Area of the dwelling.

Note: Taking the PV system credit does not require HERS verification unless getting a rebate from the New Solar Homes Partnership (NSHP).

Lighting Highlights

Mandatory High Efficacy Lighting §150.0(k)

High efficacy lighting is essential to reducing energy load in homes and dwelling units, and the 2016 Standards makes it mandatory that all residential lighting be high efficacy. The Standards do not allow trade-offs between lighting and other features when using the Performance Method.

These mandatory requirements apply to permanently installed light fixtures, including screw-based which must contain JA8 compliant lamps. Table 150.0-A summarized below, lists light source technologies qualified as high efficacy.

Table 150.0-A: High Efficacy Light Sources

Pin-based linear or compact fluorescent lamps light sources using electronic ballasts
Pulse-start metal halide lamps
High pressure sodium lamps
GU-24 sockets containing light sources other than LEDs
Inseparable SSL luminaires that are installed outdoors
Inseparable SSL luminaires containing colored light sources that are installed to provide decorative lighting

Light sources not listed in Table 150.0-A above may be certified to the Energy Commission as high efficacy in accordance with Joint Appendix 8 (JA8).

JA8 compliant light sources must be marked as "JA8-2016" or "JA8-2016-E." "JA8-2016-E" designates light sources that have passed the Elevated Temperature Life Test and are deemed appropriate for use in enclosed luminaires.

JA8 compliant light sources shown in the table below must be controlled by vacancy sensors or dimmers (exceptions for closets <70 SF and hallways, §150.0(k)2K).

Table 150.0-A & JA8: High Efficacy Light Sources

Light sources in ceiling recessed downlight luminaires
LED luminaires with integral sources
Pin-based LED lamps (MR-16, AR-111, etc.)
GU-24 based LED light source

Screw Based Luminaires §150.0(k)G

- Screw based luminaires must contain JA8 compliant light sources.
- Recessed downlight luminaires in ceilings must not contain screw-based sockets.
- Incandescent sources are prohibited from having a GU-24 base (per Title 20 Section 1605.3(k)).

Blank Electrical Boxes §150.0(k)B

- The number of blank electrical boxes more than 5 feet above the finished floor shall not be greater than the number of bedrooms.
- Additionally, these electrical boxes must be served by a dimmer, vacancy sensor, or fan speed control.

Bathrooms, Garages, Laundry Rooms, and Utility Rooms §150.0(k)2J

- At least one fixture must be controlled by a vacancy sensor.

Under Cabinet Lighting §150.0(k)2L

- Any under cabinet lighting (including kitchen) must be switched separately from other lighting systems.

Outdoor Lighting §150.0(k)3

- Must be high efficacy like indoor lighting.
- Must include manual on/off switch and one of the following:
 - Photocontrol and motion sensor
 - Photocontrol and automatic time switch control
 - Astronomical time switch control
 - Energy Management Control System



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