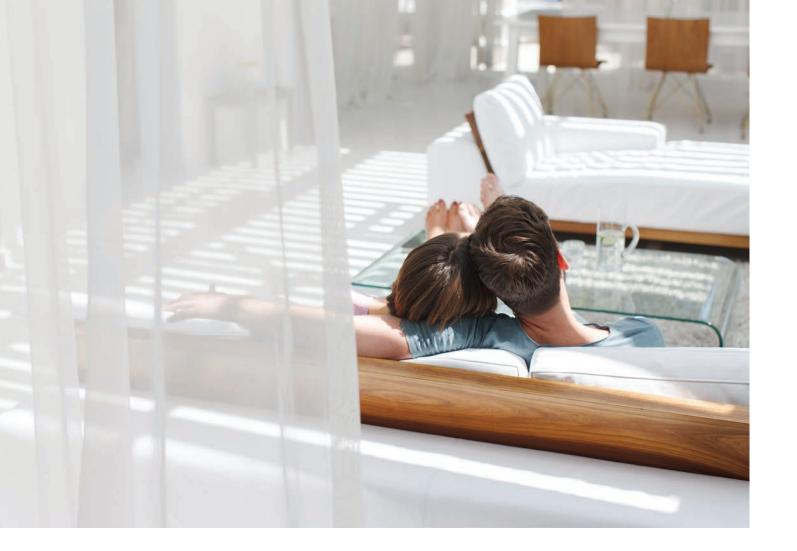# Building the future: Achieving California building energy standards in homes for today and tomorrow

Eaton solutions for residential Title 24 compliance throughout the home

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Powering Business Worldwide

TITLE 24 COMPLIANT

Effective January 1, 2020, the newest revision of California's ambitious building energy code became effective. Frequently referred to as Title 24, this standard leads the nation with energy efficiency requirements for lighting and other electrical systems throughout the home.

Maintained on a three-year, continuous maintenance cycle, the 2019 revision applies to any permits pulled on residential construction between January 1, 2020 – December 31, 2022. The table on the next page describes the basic lighting and electrical system requirements.

Title 24 Code Requirements

Code section	Code requirement
150.0(k)(1)(A)	All permanently installed luminaires to be high efficacy (refer to Table 150.0-A).
150.0(k)(1)(E)	Night lights, step lights and path lights shall not be required to comply with Table 150.0-A or be controlled by vacancy sensors provided they are rated to consume no more than 5 watts of power and emit no more than 150 lumens.
150.0(k)(2)(C)	Lighting shall have readily accessible wall-mounted controls that allow the lighting to be manually turned ON and OFF.
150.0(k)(2)(I)	Bathrooms, garages, laundry rooms, and utility rooms must have at least one luminaire that is controlled by an occupant or vacancy sensor providing automatic-off functionality. If an occupant sensor is installed, it shall be initially configured to manual-on operation using the manual control required under Section 150.0(k)2C.
150.0(k)(2)(J)	Luminaires that are or contain light sources that comply with JA8* requirements and are not controlled by occupancy or vacancy sensors, shall have dimming controls, except: • Luminaires in closets less than 70 ft^2 • Luminaires in hallways or corridors
150.0(k)(2)(K)	Undercabinet lighting shall be controlled separately from ceiling-installed lighting such that one can be turned on without turning on the other.
150.0(k)(3)	Lighting attached to residence must be high efficacy and controlled by: Photocontrol + either motion sensor or auto time switch OR Astro time clock/switch.
110.10	Single family residences located in subdivisions with ten or more single family residences and where the application for a tentative subdivision map for the residences has been deemed complete approved by the enforcement agency shall have a solar zone total area comprised of areas that have no dimension less than five feet and are no less than 80 ft^2 each for buildings with roof areas less than or equal to 10,000 ft^2 or no less than 160 ft^2 each for buildings with roof areas greater than 10,000 ft^2. Exceptions include existence of demand-response systems, rainwater catchment or greywater reuse.
150.1(c)(14)	All low-rise residential buildings shall have a photovoltaic (PV) system meeting the minimum qualification requirements as specified in Joint Appendix JA11, with annual electrical output equal to or greater than the dwelling's annual electrical usage as determined by Equation 150.1-C:

Living, family and dining room

Recommended Eaton solution

WFD30 Wi-Fi smart universal dimmer

- Control with Amazon Alexa App
- Frustration-Free Setup
- No hub required

Space characteristics of living, family and dining rooms are intermittent occupancy with a strong aesthetic atmosphere well-suited to light level control achieved via dimming.

While family rooms may have a strong individual sense of occupant ownership, living and dining rooms are more occupant-neutral. All three spaces are frequent gathering spaces, highly desirable to provide dimming control for ambiance or highlight specific areas of interest. Living and dining rooms are also more likely to have multiple light sources, with general overhead lighting but also up- or downlighting or wall scones.

Code requirement: High efficacy or JA8-compliant lighting and dimming control.

Other Eaton options

RF9640-N Z-Wave plus wireless universal dimmer

- Single pole/multi-location with presets
- No hub required
- Programmable delayed OFF mode

SUL06P Universal slide dimmer

- Soft gradual ON feature
- Single pole or 3-way
- Neutral not required

VS306U Vacancy sensor switch

- 450 ft^2 coverage pattern
- Single pole or 3-way
- Manual ON/Automatic OFF

Bedrooms

Recommended Eaton solution

DUL06P Universal decorator dimmer
- Preset return to previous light level
- Single pole or 3-way
- Neutral not required

Bedrooms are characterized by a strong individual sense of occupant ownership, along with lengthy intervals of occupancy and vacancy. Along with general lighting, there may be specific task lighting, integrated ceiling fans/lights and separate lighting in adjacent closets.

Code requirement: High efficacy or JA8-compliant lighting with dimming control.

Night lights are exempted from this and other automatic control requirements as long as they are rated to consume ≤5W and emit ≤150 lumens.

Other Eaton options

WFD30 Wi-Fi smart universal dimmer
- Control with Amazon Alexa App
- Frustration-Free Setup
- No hub required

RF9640-N Z-Wave plus universal dimmer
- Single pole/multi-location with presets
- Can be associated with up to 5 other devices

VS306U Vacancy sensor switch
- 450 ft^2 coverage pattern
- Single pole or 3-way
- Manual ON/Automatic OFF

Kitchens

WFSW15 Wi-Fi smart switch
- Control using Amazon Alexa App
- No hub required
- Programmable delayed OFF mode

Typically the most-used room in a home, kitchens combine architectural and task lighting for aesthetics and ambiance as well as functionality. Contemporary kitchens often feature general overhead lighting complemented by specific task lighting, such as over the sink, cooktop and undercabinet lighting.

Code requirement: High efficacy or JA8-compliant lighting and dimming control.

Separately switched undercabinet, sink, pantry or nook lighting.

Other Eaton options

WFD30 Wi-Fi smart universal dimmer
- Control with Amazon Alexa App
- Frustration-Free Setup
- No hub required

RF9640-N Z-Wave Plus universal dimmer
- Single pole/multi-location with presets
- Can be associated with up to 5 other devices

RF9601 Z-Wave Plus wireless switch
- Single pole, 3-way, multi-location
- Can be associated with up to 5 other devices
- Programmable delayed OFF mode

Laundry and utility rooms

Recommended Eaton solutions

VS306U Vacancy sensor switch
- 450 ft² coverage pattern
- Single pole or 3-way
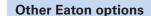- Manual ON/Automatic OFF

HDFS3P1 Humidity sensor and fan control
- Turn fan ON/OFF automatically based on preset humidity level
- Manual ON/auto OFF for fan

Important workspaces, these rooms experience intermittent occupancy of relatively short durations. Occupancy-based control to automatically turn lighting off is highly desired for convenience as well as energy efficiency.

Code requirement:
At least one luminaire controlled by occupancy or vacancy sensor configured for manual ON/automatic OFF operation.

Other Eaton options

WFSW15 Wi-Fi smart switch
- Control using Amazon Alexa App
- No hub required
- Programmable delayed OFF mode

RF9601 Z-Wave Plus wireless switch
- Single pole, 3-way, multi-location
- Can be associated with up to 5 other devices
- Programmable delayed OFF mode

OS306U Occupancy sensor switch
- Automatic ON/Automatic OFF
- Adjustable, built-in light level sensor
- Single pole or 3-way
- Replaces a standard light switch

Bathrooms

Recommended Eaton solutions

VS306U Vacancy sensor switch
- 450 ft² coverage pattern
- Single pole or 3-way
- Manual ON/Automatic OFF

HDFS3P1 Humidity sensor and fan control
- Turn fan ON/OFF automatically based on preset humidity level
- Manual ON/auto OFF operation
- Replaces single pole switch

Much like kitchens and laundry rooms, bathrooms experience intermittent use of varying duration. Functionality is typically desired over aesthetics with the desire for high quality, accurate color rendering of particular importance. Many bathrooms will include general overhead lighting together with specialized lighting for vanities, shower enclosures, and separate commode rooms.

Code requirement: At least one luminaire controlled by occupancy or vacancy sensor configured for manual ON/automatic OFF operation.

Night lights are exempted from this and other automatic control requirements as long as they are rated to consume ≤5W and emit ≤150 lumens.

Other Eaton options

WFSW15 Wi-Fi smart switch
- Control using Amazon Alexa App
- No hub required
- Programmable delayed OFF mode

DUL06P Universal decorator dimmer
- Preset return to previous light level
- Single pole or 3-way
- Neutral not required

OS306U Occupancy sensor switch
- Automatic ON/Automatic OFF
- Adjustable, built-in light level sensor
- Single pole or 3-way
- Replaces a standard light switch

RF9640-N Z-Wave Plus universal dimmer
- Single pole/multi-location with presets
- Can be associated with up to 5 other devices

RF9601 Z-Wave Plus wireless switch
- Single pole, 3-way, multi-location
- Can be associated with up to 5 other devices

Garages

VS306U Vacancy sensor switch
- 450 ft^2 coverage pattern
- Single pole or 3-way
- Manual ON/Automatic OFF

Functional, high-quality lighting is desired for garage areas, both for resident safety as well as task-oriented occupancy. Most garages feature overhead lighting with some areas of specialized lighting for work spaces or storage areas.

Code requirement: At least one luminaire controlled by occupancy or vacancy sensor configured for manual ON/automatic OFF operation.

Other Eaton options

OS306U Occupancy sensor switch
- Automatic ON/Automatic OFF
- Adjustable, built-in light level sensor
- Single pole or 3-way
- Replaces a standard light switch

Outdoor lighting (driveways, patios, sidewalks)

AT18HM Astronomic timer

- 4 operating modes: manual, automatic, random, count down
- Automatic daylight savings function
- Single pole or 3-way
- Built in back-up battery

Many new homes include significant outdoor lighting, to illuminate outdoor living spaces such as patios and cabanas, to showcase landscaping features, and to provide safety and security for residents and guests. Controlling this lighting offers energy savings as well as convenience for family members arriving home late at night or leaving early in the morning.

Code requirement: Lighting attached to a residence must be high efficacy with a control that must be a photocontrol device PLUS either a motion sensor or automatic time switch OR an astronomical clock/time switch.

Other opportunities for energy efficiency throughout the home

There are a range of other simple solutions to increase energy efficiency and savings throughout the home. Some of these are mandated by Title 24 for residential buildings while others are discretionary. Including additional energy-efficient solutions can capture significant savings and may be eligible for rebates from the homeowner's local energy provider.

Solar-ready infrastructure

Beyond lighting, Title 24 establishes additional requirements on residential electrical systems. Most notable in the latest code cycle is the requirement for solar-ready infrastructure (§110.10 and §150.1(c)(14)). To achieve compliance with life safety requirements and obtain final occupancy permits from local building inspectors, these solar-ready infrastructures must include meter breakers to ensure the safe flow of power between the home and the local electrical grid.

Catalog number	Mounting	Spaces	Circuits	Breakers	Utility main	Bus rating	PV allowed
MBE2040PV200BTF	Semi-flush	20	40	Type BR	200 A	225A	70A max
MBE2040PV200BTS	Surface	20	40	Type BR	200 A	225A	70A max
MBED3042PV200BF	Semi-flush	20	42	Type BR	200 A	225A	70A max
MBE1224PVL125F	Semi-flush	12	24	Type BR	125 A	125A	125A max
MBE1224PV100BTF	Semi-flush	12	24	Type BR	100 A	125A	50A max
MBE1224PVL100S	Surface	12	24	Type BR	100 A	100A	100A max
MBE1224PV100BTS	Surface	12	24	Type BR	100 A	125A	50A max
MBE1224PVL125S	Surface	12	24	Type BR	125 A	125A	125A max
MBE2040PV125BTF	Semi-flush	20	40	Type BR	125 A	125A	25A max
MBE1224PVL100F	Semi-flush	12	24	Type BR	100 A	100A	100A max
MBE2040PV125BTS	Surface	20	40	Type BR	125 A	225A	45A max
MBE2040PV200TS	Surface	20	40	Type BR	200 A	225A	70A max

In addition, Eaton offers a comprehensive range of meter breaker solutions for virtually every residential configuration as well as an interactive selector tool that helps contractors quickly identify the correct product.

Smart, control-responsive receptacles

Adding controllable outlets in residential spaces such as offices, media or family rooms, and bedrooms can increase a family's energy savings and may qualify for rebates from local energy providers. While not required by Title 24, these smart devices can boost energy performance without compromising the family's comfort or productivity.

Recommended Eaton solutions

WFTRCR15 Wi-Fi smart duplex receptacle

- Control of 1 outlet leaving other uncontrolled for normal use
- Controllable via Alexa voice commands
- Controllable by Alexa Amazon App
- Tamper resistant
- Dimmable LED indicator for quick ON/OFF status

RF96APM Z-Wave Plus wireless ON/OFF plug-in module

- Provides wireless control of one outlet leaving the other outlet always ON
- Can be associated with up to 4 other devices
- Voice and app based control when used with compatible Z-Wave controller or Eaton's home automation hub

Rebates

Some local jurisdictions or energy providers may offer rebates as part of energy efficiency upgrades for homes that include sensors, dimmers, or controllable receptacles. Contractors can contact their local energy provider or Energy Upgrade California® for more information.

Product selection matrix by room type

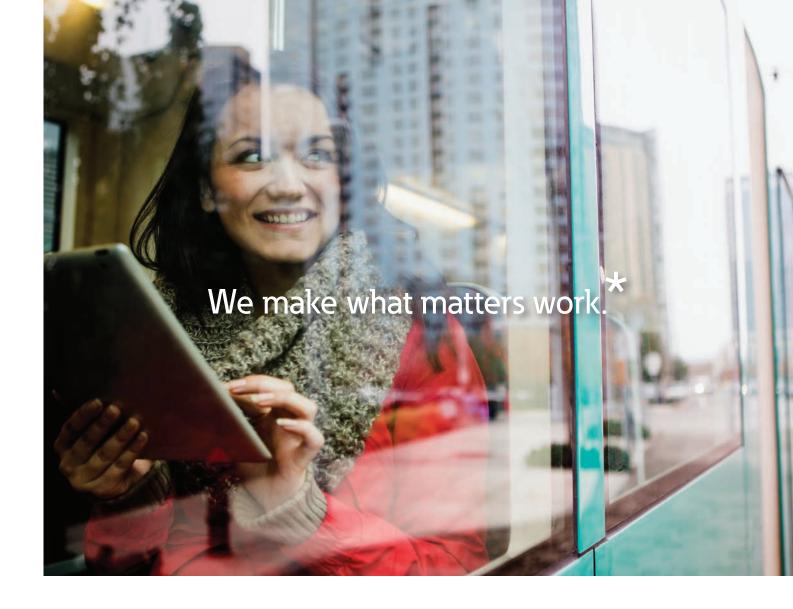| Space type	Code requirement	Eaton solution		Other considerations	
Living room	High efficacy or JA8-compliant lighting and dimming control	WFD30 Wi-Fi smart universal dimmer		WFTRCR15 Wi-Fi smart duplex receptacle	
Dining room	High efficacy or JA8-compliant lighting and dimming control	WFD30 Wi-Fi smart universal dimmer			
Kitchen	High efficacy or JA8-compliant lighting and dimming control	WFD30 Wi-Fi smart universal dimmer		WFTRCR15 Wi-Fi smart duplex receptacle	
Bathrooms	At least 1 fixture controlled by occupancy/vacancy sensor	VS306U Vacancy sensor switch		HDFS3P1 Humidity sensor and fan control	
Bedrooms	High efficacy lighting + dimming	WFD30 Wi-Fi smart universal dimmer			
Utility room	At least 1 fixture controlled by occupancy/vacancy sensor	VS306U Vacancy sensor switch		WFTRCR15 Wi-Fi smart duplex receptacle	
Laundry room	At least 1 fixture controlled by occupancy/vacancy sensor	VS306U Vacancy sensor switch		HDFS3P1 Humidity sensor and fan control	
Garage	At least 1 fixture controlled by occupancy/vacancy sensor	VS306U Vacancy sensor switch			
Outdoor lighting	Lighting attached to residence: high efficacy AND photocontrol device + motion sensor or automatic time switch OR astronomical clock/time switch	AT18HM Astronomic timer			

Additional resources

Building professionals can access a range of additional resources, including the state residential compliance manual, application and design guides, workshops, fact sheets and training sessions at no additional cost from the California Energy Commission, Energy Code Ace, and the California Lighting Technology Center (CLTC).

References and definitions

*JA8-compliant lighting refers to lighting that meets the requirements of Joint Appendix 8 For lamps to qualify as high efficacy under JA8, they must be certified and marked as either JA8-2016 or JA8-2016-E. These markings mean the light source meets the requirements of Joint Appendix JA8, and the product is listed in the Energy Commission product database. Requirements assure lamps and luminaires provide high color quality, have a long life and are energy efficient.

Notes: This guide is not intended to be used in lieu of California's Energy Code, and it is not a substitute for the Energy Code itself. Please visit www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2019-building-energy-efficiency to obtain the official 2019 Energy Code, Reference Appendices and Residential Compliance Manual.

We make what matters work.*

* At Eaton, we believe that power is a fundamental part of just about everything people do. Technology, transportation, energy and infrastructure-these are things the world relies on every day. That's why Eaton is dedicated to helping our customers find new ways to manage electrical, hydraulic and mechanical power more efficiently, safely and sustainably. To improve people's lives, the communities where we live and work, and the planet our future generations depend upon. Because that's what really matters. And we're here to make sure it works.

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