



WHAT'S NEW IN THE 2013 CODE?

Changes to mandatory Title 24 lighting requirements

California's new Building Energy Efficiency Standards take effect in 2014. They improve the energy efficiency of homes by 25 percent and make nonresidential buildings 30 percent more efficient than the previous 2008 standards. This brief guide offers an overview of important requirements and major updates to the lighting code.

This guide is not intended to replace the code itself or the California Energy Commission's 2013 Residential and Nonresidential Compliance Manuals. It is meant to serve as a quick reference for those familiarizing themselves with the code requirements.

All lighting control systems with two or more components—in both residential and non-residential spaces—must meet the requirements of 2013 Title 24 standards, **Section 110.9**. Stand-alone lighting controls, such as vacancy sensors and photocontrols, must now comply with Title 20 regulations.

NON-RESIDENTIAL INTERIOR LIGHTING REQUIREMENTS

All interior luminaires in non-residential buildings must have manual on/off controls, and each area must be independently controlled. Dimmer switches must allow manual on/off functionality, with the exception of public restrooms, which do not need a switch.

MULTI-LEVEL LIGHTING CONTROLS

In areas larger than 100 ft², installed luminaires must:

- Have at least four steps of control, or continuous dimming, depending on the lamp type (manual dimming controls must be provided for continuous dimming luminaires)
- Meet the uniformity requirements in **Table 130.1-A**
- Have at least one of the following types of controls for each luminaire:
 - Manual continuous dimming and on/off control, per **Section 130.1(a)**
 - Lumen maintenance, as defined in **Section 100.1**
 - Tuning, as defined in **Section 100.1**
 - Automatic daylighting controls, per **Section 130.1(d)**
 - Demand responsive controls, per **Section 130.1(e)**

Classrooms with a connected general lighting load $\leq 0.7 \text{ W/ft}^2$ must have at least one control step between 30% and 70% of full rated power.



More retrofit projects will be required to meet new-construction standards for both lighting power density (LPD) and controls. The only exceptions are buildings with fewer than 40 ballasts being replaced and spaces where less than 10% of the lighting is affected.

DEMAND RESPONSE CONTROLS

The 2008 code only required DR capability in retail buildings with sales floor areas $\geq 50,000$ ft². The 2013 code expands this considerably, requiring that all non-residential buildings $\geq 10,000$ ft² be capable of responding to a DR signal, so that:

- Total energy use for lighting can automatically drop to a level at least 15% below the building's maximum total lighting power
- Lighting is reduced in a manner consistent with requirements for uniform illumination levels listed in **Table 130.1-A**

Non-habitable spaces must not be used to comply with this requirement, and spaces with a lighting power density ≤ 0.5 W/ft² must not be counted toward the building's total lighting power. As in years past, designers remain responsible for specifying controls that are compatible with the local utility's DR protocol, and building operators must program lighting controls.

AUTOMATIC DAYLIGHTING CONTROLS

Under the 2008 code, daylighting controls were only required in sidelit spaces $\geq 2,500$ ft² and skylit zones $\geq 8,000$ ft². **Section 110.9** of the 2013 code requires daylighting controls for sidelit spaces with controlled general lighting ≥ 120 W and skylit zones $\geq 5,000$ ft². This means daylighting controls will be implemented into virtually every office or commercial space with skylights or windows.

OCCUPANT-SENSING LIGHTING CONTROLS

As with the 2008 code, occupancy sensors and lighting controls are required in the following areas:

- Offices ≤ 250 ft²
- Conference rooms of any size
- Multipurpose rooms < 1000 ft²
- Classrooms of any size

SECURITY AND EGRESS LIGHTING

Under the 2008 code, most buildings were allowed to keep approximately 15 percent of their full lighting capacity on at all times for security and egress purposes. This allowance has been either eliminated entirely or drastically reduced under the new standards:

- Building areas that are not occupied 24/7 will no longer be able to leave lighting on during unoccupied periods
- Modest allowances for egress lighting remain, but egress lighting must be shut off outside occupied times along with general lighting
- Only offices will be allowed to maintain 24/7 lighting, but only along designated paths of egress, and at a reduced maximum of just 0.05 W/ft², (versus 0.3 W/ft² under the previous code)

SECONDARY SPACES

The 2013 code requires occupant-sensing controls that automatically reduce lighting power by 50% in these areas when they are unoccupied:

- Corridors and stairwells
- Warehouse aisles and open areas
- Library book stack aisles that are accessible from only one end and are ≥ 10 ft in length; those that are accessible from both ends and are ≥ 20 ft in length must adhere to the same standard

PARKING GARAGES & AREAS

Parking garages are classified as indoor spaces under Title 24 lighting regulations and must comply with **Section 130.1(c)7B**. Top-level roof areas are the exception; these are classified as outdoor hardscape and must comply with the applicable provisions in **Section 130.2**. The following regulations are new for parking garages:

- In parking garages, parking areas, and loading and unloading areas, general lighting must be controlled by occupant-sensing controls having at least one control step between 20% and 50% of design lighting power
- In a parking garage area with a combined total of 36 ft² or more of glazing or opening, luminaires providing general lighting that are in the combined primary and secondary sidelit daylit zones must be controlled independently by automatic photocontrols
- Automatic daylighting controls must be multi-level, continuous dimming or on/off
- When primary sidelit zones receive sufficient daylight to reach illuminance levels above 150% of that provided by electric lighting when no daylight is available, controls must reduce lighting power consumption to zero

NON-RESIDENTIAL OUTDOOR LIGHTING REQUIREMENTS

The 2008 code required all outdoor lighting to be equipped with either a photocontrol system or an automatic scheduling control system; the new code requires both. **Section 130.2(c)** addresses these requirements. All installed outdoor lighting must be circuited to turn off independently from other electrical loads. Motion sensors and controls are also required, in addition to photocontrols and automatic scheduling, for certain outdoor lighting applications.

LUMINAIRES MOUNTED ≤ 24 FT ABOVE THE GROUND

No more than 1,500 W of lighting power may be controlled together for outdoor lighting of this type. Automatic lighting controls for these luminaires must:

- Utilize motion sensors or another automatic lighting control system, in addition to photocontrols and automatic scheduling controls
- Be capable of automatically reducing the lighting power of each luminaire by at least 40%, but not more than 80%, or provide continuous dimming through a range that includes 40–80%
- Have auto-on functionality when the area becomes occupied

Exceptions

These types of lighting constitute exceptions to the above requirements:

- Pole-mounted luminaires with a maximum rated wattage of 75 W
- Non-pole-mounted luminaires with a maximum rated wattage of 30 W
- Linear lighting with a maximum wattage of 4 W per linear foot of luminaire
- Outdoor sales: frontage, lots and canopies

372 GWh/year

*The amount of electricity that can be saved by the 2013 improvements to non-residential standards alone.**

California Energy Commission Staff Presentation (May 31, 2012) *Includes HVAC, water heating, etc. in addition to lighting

OUTDOOR SALES LIGHTING

Outdoor sales lighting for frontage areas, lots and canopies must utilize automatic lighting controls that:

- Can automatically reduce lighting power by at least 40% but not more than 80%
- Provide auto-on functionality

BUILDING FACADES, ORNAMENTAL HARDSCAPE AND OUTDOOR DINING AREAS

Lighting for these areas must have an automatic lighting control installed that enables one or both of the following control strategies:

- Motion sensors capable of automatically reducing lighting power by at least 40% but not more than 80% during vacant periods, with auto-on functionality
- A centralized time-based zone lighting control capable of automatically reducing lighting power by at least 50%

Wall packs (defined by the IES Handbook as outdoor wall-mounted luminaires having a bilaterally symmetric distribution) must comply with the applicable requirements in **Section 130.2(c)3** where the bottom of the luminaire is mounted ≤ 24 ft above the ground.

OUTDOOR INCANDESCENT LIGHTING

All outdoor incandescent luminaires rated over 100W and installed for non-residential use must be controlled by a motion sensor in addition to photocontrols and scheduling controls.

GLARE CONTROL

The 2013 code requires all outdoor luminaires ≤ 150 W to comply with the IES BUG system for assessing and limiting backlight, uplight and glare. This marks a change from the older cutoff system, which only applied to luminaires ≤ 175 W under the 2008 standards.

RESIDENTIAL INTERIOR LIGHTING REQUIREMENTS

The 2013 standards introduce requirements for high-efficacy sources, as well as vacancy sensors and controls, in bathrooms, utility rooms and other residential spaces. The new code also raises standards for the energy-efficiency of skylights and windows.

SWITCHING DEVICES AND CONTROLS

The following are mandatory requirements:

- High-efficacy luminaires must be switched separately from low-efficacy luminaires
- Exhaust fans must be switched separately from lighting systems
- Luminaires must be switched with readily accessible controls that permit manual on/off switching
- No controls may bypass a dimmer or vacancy sensor function where that dimmer or vacancy sensor has been installed to comply with **Section 150.0(k)**

ELECTRONIC BALLASTS

Ballasts for fluorescent lamps rated ≥ 13 W must be electronic and have an output frequency ≥ 20 kHz.

KITCHENS

A minimum of 50% of the total rated wattage of permanently installed lighting in kitchens must be high-efficacy lighting.



CABINETS

Lighting that is permanently installed inside cabinets may use no more than 20W of power per linear foot of illuminated cabinet.

Regardless of the number of shelves or doors per cabinet section, the length of an illuminated cabinet must be determined using one of the following measurements:

- One horizontal length of illuminated cabinet
- One vertical length per illuminated cabinet section
- No more than one vertical length per every 40 horizontal inches of illuminated cabinet

BATHROOMS

A minimum of one high-efficacy luminaire must be installed in each bathroom. All other lighting must be high efficacy or controlled by vacancy sensors.

NIGHT LIGHTS

Permanently installed night lights and night lights integral to installed luminaires or exhaust fans must be rated to consume no more than 5W of power per luminaire and may not be controlled by vacancy sensors.

GARAGES, LAUNDRY ROOMS AND UTILITY ROOMS

Lighting installed in attached and detached garages, laundry rooms and utility rooms must be high-efficacy and controlled by a vacancy sensor.

OTHER AREAS

Lighting installed in any rooms or areas other than those above must be high efficacy or must be controlled by either dimmers or vacancy sensors.



New quality standards require all residential LED luminaires to be certified to the California Energy Commission. Requirements include accurate color rendering (CRI 90 or above) and a warm color temperature like incandescent lamps (CCT: 2700K or 3000K).

RESIDENTIAL OUTDOOR LIGHTING REQUIREMENTS

For single-family residential buildings, outdoor lighting permanently mounted to a residential building or other buildings on the same lot must generally be high efficacy.

Low-efficacy outdoor lighting must be controlled by all of the following:

- A manual on/off switch that does not override to on
- A motion sensor not having an override or bypass switch that disables the motion sensor, or a motion sensor with an override switch that temporarily bypasses the motion sensing function and automatically reactivates the motion sensor within 6 hours
- A photocontrol, astronomical time clock or energy management control system that does not have an override or bypass switch disabling the control and is programmed to automatically turn the outdoor lighting off during daylight hours

TABLE 130.1 - A

MULTI-LEVEL LIGHTING CONTROLS AND UNIFORMITY REQUIREMENTS		
Luminaire Type	Minimum Required Control Steps (Percent of Full Rated Power)	Uniform Level of Illuminance Shall Be Achieved by:
Line-voltage sockets except GU-24	Continuous dimming 10–100%	
Low-voltage incandescent systems		
LED luminaires and LED source systems		
GU-24 rated for LED		
GU-24 sockets rated for fluorescent > 20 W	Continuous dimming 20–100%	
Pin-based compact fluorescent > 20 W		
GU-24 sockets rated for fluorescent ≤ 20 W	Minimum one step between 30–70%	<ul style="list-style-type: none"> ▪ Stepped dimming or ▪ Continuous dimming or ▪ Switching alternate lamps in a luminaire
Pin-based compact fluorescent ≤ 20 W		
Linear fluorescent and U-bent fluorescent ≤ 13 W		
Linear fluorescent and U-bent fluorescent > 13 W	Minimum one step in each range: 20–40% 50–70% 80–85% 100%	<ul style="list-style-type: none"> ▪ Stepped dimming or ▪ Continuous dimming or ▪ Switching alternate lamps in each luminaire, having a minimum of 4 lamps per luminaire, illuminating the same area and in the same manner
Track Lighting	Minimum one step between 30–70%	<ul style="list-style-type: none"> ▪ Step dimming or ▪ Continuous dimming or ▪ Separately switching circuits in multi-circuit track with a minimum of two circuits
HID > 20 W	Minimum one step between 50–70%	<ul style="list-style-type: none"> ▪ Stepped dimming or ▪ Continuous dimming or ▪ Switching alternate lamps in each luminaire, having a minimum of 2 lamps per luminaire, illuminating the same area and in the same manner
Induction > 25 W		
Other light sources		

ADDITIONAL RESOURCES

CALIFORNIA ENERGY COMMISSION

www.energy.ca.gov/title24/2013standards

For nearly 35 years, the California Energy Commission has saved Californians more than \$66 billion in energy costs through its standards for energy-efficient buildings and appliances. These same standards have improved windows, lighting, air conditioning and insulation while reducing greenhouse gas emissions by more than 250 million metric tons.

CALIFORNIA'S 2013 BUILDING ENERGY EFFICIENCY STANDARDS: AN INFOGRAPHIC

www.energy.ca.gov/title24/2013standards/rulemaking/documents/2013_Building_Energy_Efficiency_Standards_infographics.pdf

A quick look at some of the most important changes to both the residential and non-residential standards.

FREQUENTLY ASKED QUESTIONS

www.energy.ca.gov/title24/2013standards/rulemaking/documents/2013_Building_Energy_Efficiency_Standards_FAQ.pdf

Answers to some of the most commonly asked questions about the Building Energy Efficiency Standards.

ADOPTION HEARING PRESENTATION

www.energy.ca.gov/title24/2013standards/rulemaking/documents/2012-05-31_2013_standards_adoption_hearing_presentation.pdf

A recent presentation on the new standards' potential impacts and their benefits to Californians.

PROPOSED 2013 BUILDING ENERGY EFFICIENCY STANDARDS

www.energy.ca.gov/2012publications/CEC-400-2012-004/CEC-400-2012-004-15DAY.pdf

The most up-to-date version of the 2013 Building Energy Efficiency Standards, currently undergoing the final stages of the revision process.

CALIFORNIA LIGHTING TECHNOLOGY CENTER

cltc.ucdavis.edu/title24

Visit the CLTC website for additional resources regarding Title 24, including lighting design guides for retail, office and residential spaces.

ABOUT THE CALIFORNIA LIGHTING TECHNOLOGY CENTER: *The California Lighting Technology Center was created in 2003 by the California Energy Commission in collaboration with the U.S. Department of Energy and the National Electrical Manufacturers Association. Part of the Department of Design at the University of California, Davis, CLTC is dedicated to accelerating the development and deployment of energy-efficient lighting and daylighting technologies.*