

# Changes to Title 24 Lighting Requirements

California's new building energy efficient standards took effect July 2014. The goal is to make nonresidential buildings 30% more energy efficient than the previous 2008 standards. The next 16 slides give an overview of the important requirements and major updates to the lighting code

# Changes to Title 24 Lighting Requirements

- New requirements for lighting controls initiates one of the biggest changes to Title 24 standards.
- The new standard also includes stricter requirements for testing and certification of controls commissioning.
- All lighting control systems with two or more components in non-residential spaces must meet the requirements of 2013 Title 24 standards section 110.9.
- Stand-alone and luminaire integrated lighting controls such as occupancy/vacancy sensor and photocontrols must now comply with Title 20 regulations.

# Changes to Title 24 Lighting Requirements

## Non Residential Indoor Lighting Requirements

- All interior luminaires in non-residential buildings must have manual on/off controls.
- Each area must be independently controlled.
- Dimmer switches must allow manual on/off functionality with some exceptions such as public restrooms with two or more stalls, which do not need a publicly available switch.

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## Multi-Level Lighting Controls

In areas larger than 100ft<sup>2</sup> installed luminaires must:

- Incorporate multi-level lighting controls or continuous dimming depending on the lamp type.
- Meet uniformity levels as per Table 130.1A

Have at least one of the following types of controls for each luminaire

- Manual continuous dimming and on/off control (Section 130.1(a))
- Lumen maintenance (Section 100.1)
- Tuning (Section 100.1)
- Automatic daylighting controls (Section 130.1(d))
- Demand response controls (Section 130.1(e))

Note:

Classroom lighting is one of the rare exceptions to multi-level requirements. If they have a connected general lighting load <0.7W/ft<sup>2</sup> they must have at least one control step between 30% and 70% of full rated power.

# Changes to Title 24 Lighting Requirements

## Automatic Daylighting Controls

- In section 140.3(c) of the 2008 code only 50% of the floor area in buildings over 8,000 ft<sup>2</sup> was required to be in daylighting zones. Section 130.1(d) of the 2013 code requires that floor plans have 75% of their total area in daylighting zones in building greater than 5000 ft<sup>2</sup>.
- In daylighting zones controls requirements have become more exacting. In the 2008 code only sky-lit spaces  $\geq 2,500$  ft<sup>2</sup> and side lit spaces 250 ft<sup>2</sup> had to have daylighting controls. Section 130.1(d) requires multi-level automatic daylighting controls in all Sky-lit or Side-lit zones where the installed general lighting power is  $\geq 120$ W

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## Occupancy Lighting Controls

Section 119 requires occupancy sensing lighting controls in the following areas:

- Offices  $\leq 250$  ft<sup>2</sup>
- Conference rooms of any size
- Multipurpose rooms  $\leq 1000$  ft<sup>2</sup>
- Classrooms of any size
- Secondary spaces
- Indoor parking areas

Note:  
Indoor parking areas including parking garages and secondary spaces are new additions to the code

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## Secondary Spaces

The 2013 code demands that occupancy sensing controls must automatically reduce lighting power by 50% in these secondary spaces when unoccupied:

- Corridors and Stairwells
- Warehouse aisles and open areas
- Library book shelve aisles  $\geq 10$ ft in length accessible from one end or  $\geq 20$ ft in length accessible from both ends

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## Security and Egress Lighting

- Maximum security egress lighting allowance of  $0.2\text{W}/\text{ft}^2$  when building is occupied.
- General and egress lighting must be shut off during unoccupied times.

### Exception:

- Offices are allowed up to  $0.05\text{W}/\text{ft}^2$  for lighting during unoccupied periods only along emergency egress areas designated on the building plans



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Table 130.1-A

Luminaire Type	Minimum required control steps (% of full rated power)	Uniform level of Illuminance shall be achieved by:
LED luminaires and LED source systems	Continuous dimming 10 – 100%	
Pin based CFL >20W	Continuous dimming 10 – 100%	
Linear fluorescent >13W	Minimum one step in each range 20-40% 50-70% 80-85% 100%	<ul style="list-style-type: none"> <li>• Stepped dimming</li> <li>• Continuous dimming</li> <li>• Switching alternative lamps in each luminaire having a minimum of 4 lamps per luminaire</li> </ul>
HID >20W	Minimum one step between 50-70%	<ul style="list-style-type: none"> <li>• Stepped dimming</li> <li>• Continuous dimming</li> <li>• Switching alternative lamps in each luminaire having a minimum of 2 lamps per luminaire</li> </ul>
Induction >25W		
Other Light Sources		

# Changes to Title 24 Lighting Requirements

## Demand Response Controls

The 2013 code requires that all non-residential buildings  $\geq 10,000$  ft<sup>2</sup> be capable of automatically responding to a DR signal so that:

- Total energy use for lighting can automatically drop to a level at least 15% below the buildings maximum total lighting power.
- Lighting is reduced in a manner consistent with requirements of uniformity levels as per Table 130.1-A

Note:

Non habitable spaces must not be used to comply with this requirement, spaces with a lighting power density  $\leq 0.5$ W/ft<sup>2</sup> are not counted toward the buildings total lighting power. Designers remain responsible for specifying automated controls that are compatible with the local utilities DR protocol

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## Parking Garages & Areas

In Title 24 parking garages are classified as indoor spaces and must comply with Section 130.1(c)7B. Top level roof areas are the exception, these must comply with Section 130.2. The following regulations are new for parking garages.

- In parking garages, indoor parking areas, loading and unloading areas, general lighting must be controlled by occupancy sensing controls having at least one control step between 20% & 50% of design lighting power.
- In a parking garage area with a combined total of 36 ft<sup>2</sup> or more glazing or openings, luminaires providing general lighting, combined in primary and secondary daylight side-lit zones must be controlled independently with automatic photocontrols.
- Automatic daylighting controls must be multi-level continuous dimming or on/off.
- When primary side-lit 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 to zero

# Changes to Title 24 Lighting Requirements

## Outdoor Lighting Requirements

- Outdoor lighting must be circuited and independently controlled from other electric loads.
- All outdoor luminaires with lamps  $\geq 150\text{W}$  must comply with the IES BUG system for assessing and limiting uplight and GLARE.
- No backlight requirements in this iteration of the code

# Changes to Title 24 Lighting Requirements

## Automatic daylighting controls

Title 24 2008 required photocontrol devices for all outdoor lighting. In addition to photocontrols the 2013 standards require automatic scheduling controls. Astronomical time clocks that automatically turn lights off during the day are allowed as an alternative to photocontrols. Section 130.2(c) addresses these requirements

# Changes to Title 24 Lighting Requirements

## Luminaires mounted <24ft above the ground

In addition to photocontrols and automatic scheduling Section 130.2(c) also requires occupancy sensing for certain outdoor lighting applications. No more than 1,500W 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 for astronomical clocks.
- 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% during vacant periods.
- Switch on automatically 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 75W
- Non pole mounted luminaires with a maximum rated wattage of 30W
- Linear lighting with a maximum wattage of 4W per linear foot of luminaire
- Outdoor sales, frontage, lots and canopies

# Changes to Title 24 Lighting Requirements

## Outdoor Sales Lighting

The 2013 code adds Occupancy sensing controls to the requirements for outdoor sales lighting for frontage areas, lots and canopies. Lighting controls in these areas must meet the requirements that apply to all outdoor lighting and they must automatically:

- Reduce lighting power by at least 40% but not more than 80% during vacant periods
- Switch to the higher lighting level when the space becomes occupied.

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Building facades ornamental hardscape and outdoor dining areas

Like outdoor sales areas these areas must have lighting controls that reduce energy use during unoccupied periods and automatically increase light levels when the space becomes occupied. One or both of the following controls strategies are allowed:

Motion sensors capable of automatically reducing lighting power by at least 40% but not more than 80% during vacant periods

A centralized time based zone lighting control capable of automatically reducing lighting power by at least 50%

Note:

Wall packs identified by the IES handbook as outdoor wall mounted luminaires having bilaterally symmetric distribution must comply with the acceptable requirements in Section 130.2(c)3 where the bottom of the luminaire is mounted  $\leq 24$ ft above the ground.



# Changes to Title 24 Lighting Requirements

## Commissioning & Acceptance Testing Requirements

Title 24 now requires that a commissioning report be completed and provided to each building owner. This includes reports on all functional performance tests completed as part of the acceptance test process.

Projects issued a building permit must undergo acceptance testing for:

- Automatic daylighting controls
- Automatic time switch controls
- Occupancy sensors
- Outdoor lighting shut off controls
- Outdoor motion sensors
- Demand response (DR) controls

Note:

Testing of DR controls is a new requirement under Title 24 2013. Building commissioning requirements are addressed in Section 120.8 Lighting controls acceptance test technicians must be certified through an approved training program such as the California Advanced Lighting Controls Training Program (CALCTP) and registered with the State of California. Technician employers must also be certified. Technician training and certification requirements are addressed in Section 13.11 (page 1049) of the non-residential compliance manual.