

Title 24

A Guide to the 2022 Update

This guide contains an overview of major changes to the California Energy Efficient Building Standards.

To ensure your building project is fully compliant with Title 24, please email us at www.enlightedinc.com/support.

California's Building Energy Efficiency Standards are updated every three years – with the most recent update occurring in 2022. The 2022 code changes are now in effect, applying to any new or retrofit project issued a permit starting January 1, 2023.

With the 2022 update, there are a range of new requirements for lighting and control systems in nonresidential buildings. The definitions of Lighting and Lighting Controls have been revised and combined. (§ 100.1) High-rise Residential buildings have been removed from Subchapter 3. (§ 120.0)

Enlighted provides immediate compliance with the lighting control requirements in the 2022 revisions of Title 24 and goes above and beyond what is required by the code.

For example:

- Each update of Title 24 creates new requirements for building projects. Installing Enlighted now enables immediate compliance and helps to avoid future costs and unexpected project delays.
- Utility incentives are changing rapidly – new utility incentives are being created for systems that go beyond Title 24 compliance. Installing Enlighted simplifies the utility rebate process on building projects.
- Installing Enlighted prepares building owners to immediately qualify for future utility rebates as they emerge.

Key Highlights from the 2022 update

- **Demand Responsive Lighting Controls** are required for Nonresidential lighting systems with a general lighting power of 4,000 Watts or greater, instead of the 10,000 square foot building threshold in the 2019 version (§ 110.12c). Controlled receptacles must automatically turn off all loads connected in response to a demand response signal (§ 110.12e). Enlighted's Manage software preforms the Demand Response functionality required and the Enlighted Plug Load Controller meets these new load shedding requirements.
- **Occupancy Sensor Ventilation Controls** are required for zones that are both permitted to have their ventilation air reduced to zero while in occupied standby mode per Table 120.1-A and required to install occupant sensors to comply with Section 130.1. (§ 120.1.5). When occupant sensors controlling lighting are also used for ventilation, the ventilation signal shall be independent of daylighting, manual lighting overrides or manual control of lighting (§ 120.1.5b). Enlighted's On-Premises Manage server reports Occupied/Unoccupied sensor data every 5 minutes to the BMS by HVAC zone via BACnet/IP integration.
- **Multilevel Lighting Controls** – The general lighting of any enclosed area 100 square feet or larger with a connected lighting load that exceeds 0.5 watts per square foot shall provide multilevel lighting controls that allow the level of lighting to be adjusted up and down. The multilevel controls shall provide the number of control steps and meet the uniformity requirements specified in TABLE 130.1-A. (§ 130.1(b))
 - o EXCEPTION 4 to Section 130.1(b): Classrooms with a connected general lighting load of 0.7 watts per square feet or less shall have a minimum of one control step between 30-70 percent of full rated power, regardless of luminaire type.
 - o EXCEPTION 5 to Section 130.1(b): The following shall have a minimum of one control step between 20-60 percent of full rated power, regardless of luminaire type:
 1. Library stack aisles;
 2. Warehouse aisle ways;
 3. Warehouse open areas;
 4. parking garages;
 5. parking areas;
 6. loading and unloading areas;
 7. stairwells; and
 8. corridors.
- **Shut-OFF Controls** – Occupant Sensing Controls are required for specified offices, multipurpose rooms, classrooms, conference rooms and restrooms. In offices 250 square feet or smaller, multipurpose rooms of less than 1,000 square feet, classrooms of any size, conference rooms of any size, and restrooms of any size, lighting shall be controlled with occupant sensing controls to automatically shut OFF all of the lighting when the room is unoccupied. (§ 130.1(c)5)

No other Title 24 - 2022 changes in this Section

- Partial OFF occupant sensing controls are required for aisle ways and open area in warehouses, library book stack aisles, corridors and stairwells, and specified offices. Lighting installed in the following areas shall meet the following requirements below in addition to complying with Section 130.1(c)1. (§ 130.1(c)6)
 - o In office spaces greater than 250 square feet, general lighting shall be controlled with occupant sensing controls that meet all of the following: (§ 130.1(c)6.D).
 - i. The occupant sensing controls shall be configured so that lighting shall be controlled separately in control zones not greater than 600 square feet. For luminaires with an embedded occupant sensor that are capable of reducing power independently from other luminaires, each luminaire can be considered its own control zone; and
 - ii. Within 20 minutes of the control zone being unoccupied, the occupant sensing controls shall uniformly reduce lighting power in the control zone to no more than 20 percent of full power; and
 - iii. Within 20 minutes of the entire office space being unoccupied, the occupant sensing controls shall automatically turn off lighting in all control zones in the space; and
 - iv. In each control zone, lighting shall be allowed to automatically turn on to full power upon occupancy within the control zone. When occupancy is detected in any control zone in the space, the lighting in other control zones that are unoccupied shall operate at no more than 20 percent of full power.
 - EXCEPTION to Section 130.1(c)6D: Under-shelf or furniture-mounted task lighting controlled by a local switch and either a time clock or an occupancy sensor.
- Partial OFF occupant sensing controls are required for specified stairwells and common area corridors, parking garages, parking areas, and loading and unloading areas. Lighting installed in the following areas shall meet the requirements below instead of complying with Section 130.1(c)1. (§ 130.1(c)7)
 - A. Lighting in stairwells and common area corridors that provide access to guest rooms and of hotel/ motels shall be controlled with occupant sensing controls that automatically reduce lighting power by at least 50 percent when the areas are unoccupied. The occupant sensing controls shall be capable of automatically turning the lighting fully ON only in the separately controlled space and shall be automatically activated from all designed paths of egress.

EXCEPTION to Section 130.1(c)7A: In corridors and stairwells in which the installed lighting power is 80 percent or less of the value allowed under the Area Category Method, occupant sensing controls shall reduce power by at least 40 percent.

No other Title 24 - 2022 changes in this Section
- **Automatic Daylighting Controls** – The general lighting in skylit daylit zones primary sidelit daylit zones, and secondary sidelit daylit zones, as well as the general lighting in the combined primary and secondary sidelit daylit zones in parking garages, shall be provided with controls that automatically adjust the power of the installed lighting up and down to keep the total light level stable as the amount of incoming daylight changes. For skylights located in an atrium, the skylit daylit zone definition shall apply to the floor area directly under the atrium and the top floor area directly adjacent to the atrium. (§ 130.1(d))
 - 1. All skylit daylit zones, primary sidelit daylit zones, secondary sidelit daylit zones, and the combined primary and secondary sidelit daylit zones in parking garages shall be shown on the plans.

NOTE: Parking areas on the roof of a parking structure are outdoor hardscape, not skylit daylit areas.

2. The automatic daylighting controls shall provide separate control for general lighting in each type of daylit zone. General lighting in both overlapping skylit daylit zone and a sidelit daylit zone shall be controlled as part of the skylit daylit zone. General lighting in overlapping primary and secondary sidelit daylit zones shall be controlled as part of the primary sidelit daylit zone. LED and other solid state lighting (SSL) light sources may be treated as linear lamps in increments of 4 feet segments or smaller, and each segment is separately controlled based on the type of the daylit zone the segment is primarily located.

3. The automatic daylighting controls shall:

- A. For spaces required to install multilevel controls under Section 130.1(b), adjust lighting via continuous dimming or the number of control steps provided by the multilevel controls;
- B. For each space, ensure the combined illuminance from the controlled lighting and daylight is not less than the illuminance from controlled lighting when no daylight is available.
- C. For areas other than parking garages, ensure that when the daylight illuminance is greater than 150 percent of the design illuminance received from the general lighting system at full power, the general lighting power in that daylight zone shall be reduced by a minimum of 65 90 percent; and
- D. For parking garages, ensure that when daylight illuminance levels measured at the farthest edge of the secondary sidelit zone away from the glazing or opening are greater than 150 percent of the illuminance provided by the controlled lighting when no daylight is available, the controlled lighting power in the combined daylight zones shall be reduced by 100 percent.

EXCEPTION 3 to Section 130.1(d): Rooms in which the combined total installed general lighting power in the Skylit Daylit Zone and Primary Sidelit Daylit Zone is less than 120 Watts, or in which the combined total installed general lighting power in Secondary Sidelit Daylit Zone is less than 120 watts, or in which the combined total installed general lighting power in primary and secondary sidelit daylit zone is less than 240 Watts, or in parking garage areas where the total combined general lighting power in the sidelit daylit zones is less than 60 watts.

EXCEPTION 5 to Section 130.1(d): For parking garages, luminaires located in the daylight adaptation zone.

- **Control Interactions** – Each lighting control installed to comply with Section 130.1(a) through(e) shall permit or incorporate the functions of the other lighting controls required. (§ 130.1(f))

8. For lighting controlled by automatic daylighting controls and by occupant sensing controls, the controls shall be configured so that power does not exceed the lesser of the allowed power by either control.

9. For space conditioning system zones serving only spaces that are required to have occupant sensing controls as specified in Section 130.1(c), and where Table 120.1-A allows the ventilation air to be reduced to zero when the space is in occupied-standby mode, the space conditioning system shall be controlled by occupancy sensing controls as specified in Section 120.2(e)3.

- **Outdoor Lighting Controls and Equipment** (§ 130.2)

- **Luminaire Shielding Requirements** – All outdoor luminaires of 6,200 initial luminaire lumens or greater, shall comply with Backlight, Uplight, and Glare (collectively referred to as “BUG” in accordance with ANSI /IES TM-15-20, Annex A) requirements in accordance with Title 24, Part 11, Section 5.106.8. (§ 130.2(b))
 - EXCEPTION 6 to Section 130.2(b): Luminaires that illuminate the public right of way including publicly- maintained or utility-maintained roadways, sidewalks, and bikeways.
 - EXCEPTION 7 to Section 130.2(b): Outdoor lighting attached to a hotel/motel building and separately controlled from the inside of a guest room.
- **Controls for Outdoor Lighting** – Outdoor lighting shall be independently controlled from other electrical loads, and the controls for outdoor lighting shall meet the following functional requirements: (§ 130.2(c))
 - o Automatic Scheduling Controls (§ 130.2(c)2)
 - A. Automatic scheduling controls shall be installed for all outdoor lighting. Automatic Scheduling Controls may be installed in combination with motion sensing controls or other outdoor lighting controls.
 - o Motion Sensing Controls (§ 130.2(c)3)
 - A. Motion sensing controls shall be installed for the following luminaires. Motion sensing controls may be installed for other outdoor lighting and in combination with other outdoor lighting controls.
 - ii. Outdoor luminaires other than Building Façade, Ornamental Hardscape, Outdoor Dining, or Outdoor Sales Frontage lighting, where the bottom of luminaire is mounted 24 feet above grade or lower; and,
 - iii. Outdoor wall mounted luminaires installed for Building Façade, Ornamental Hardscape or Outdoor Dining lighting that have a bilaterally symmetric distribution as described in the IES Lighting Library™ and mounted 24 feet above grade or lower.
- **Lighting Control Acceptance and Installation Certificate Requirements** (§ 130.4)
 - o **Lighting and Receptacle Control Acceptance Requirements** – Before an occupancy permit is granted, indoor and outdoor lighting and receptacle controls serving the building, area, or site and installed to comply with Sections 110.12, 130.1, 130.2, 130.5 or 140.6 shall be certified as meeting the Acceptance Requirements for Code Compliance, as specified by the Reference Nonresidential Appendix NA7.6 and NA7.8. A Certificate of Acceptance shall be submitted to the enforcement agency under Section 10-103(a) of Part 1, that the equipment and systems meet the acceptance requirements: (§ 130.4(a))
 - 3. Automatic daylight controls and shall be tested in accordance with Reference Nonresidential Appendix NA7.6.1;
 - 4. Lighting shut-OFF controls and shall be tested in accordance with Reference Nonresidential Appendix NA7.6.2;
 - 5. Demand responsive lighting controls comply with Section 130.1(e) and shall be tested in accordance with Reference Nonresidential Appendix NA7.6.3; and
 - 6. Outdoor lighting controls shall be tested in accordance with Reference Nonresidential Appendix NA7.8; and

7. Lighting systems receiving the Institutional Tuning Power Adjustment Factor shall be tested in accordance with Reference Nonresidential Appendix NA7.6.4.
8. Demand responsive controls required to control controlled receptacles shall be tested in accordance with Reference Nonresidential Appendix NA7.6.5.

Overview of Table 130.1-A Multilevel Lighting Controls - 2022 changes

Lighting - Luminaire Type	Minimum Required Control Steps (percent of full rated power ¹) / Uniform level of Illuminance shall be achieved by:	How Enlighted Provides Immediate Compliance and Future Proofing
LED Luminaires and LED Source Systems (with appropriate driver) Line-voltage sockets except GU- 24 Low-voltage incandescent systems	§ 130.1(a) Continuous dimming 10-100%	Enlighted sensors continuously dim fixtures in tune with the ambient light level, space occupancy, and the individual's preferences. • The Enlighted system is distributed and does not require centralized control. • Enlighted is the only advanced lighting system that can be quickly and easily reprogrammed when the floor plan changes.
Fluorescent luminaires (with appropriate dimming ballast)	§130.1(a) Continuous dimming 20-100%	Every light fixture is equipped with an Enlighted sensor and is fully programmable.
GU-24 sockets rated for fluorescent ≤ 20W Pin-based Compact Fluorescent ≤ 20W ² (with appropriate ballast) Linear Fluorescent and U-bent Fluorescent ≤ 13W (with appropriate ballast) Track Lighting	§130.1(a) Minimum one step between 30-70% • Continuous dimming or • Stepped dimming or • Switching alternate lamps in a luminaire or • Separately switching circuits in multi-circuit track with a minimum of two circuits.	Enlighted sensors are programmable, and are easily configured for continuous dimming. • Continuous dimming according to the activity and ambient light is preferable for both people's comfort and superior energy savings.
Linear Fluorescent and U-bent fluorescent > 13 W (with appropriate ballast)	Minimum one step in each range: 20-40% / 50-70% / 75-85% / 100% • 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.	The Enlighted system continuously dims to optimize both energy and people efficiency for every 100 square feet of space.
Other light sources, including HID and Induction	§130.1(a) Minimum one step between 50-70% • 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.	Enlighted sensors can be programmed to continuously dim or brighten the lights according to the amount of daylight present in the space.
1. Full rated input power of driver, ballast and lamp, corresponding to maximum ballast factor 2. Includes only pin based lamps: twin tube, multiple twin tube, and spiral lamps		

- **Prescriptive Requirements for Indoor Lighting** (§ 140.6)
 - o Reduction of wattage through controls. In calculating Adjusted Indoor Lighting Power, the installed watts of a luminaire providing general lighting in an area listed in TABLE 140.6-A may be reduced by the product of
 - (i) the number of watts controlled as described in TABLE 140.6-A, times
 - (ii) the applicable Power Adjustment Factor (PAF), if all of the following conditions are met: (§ 140.6(b)2)
 - C. The controlled lighting is permanently installed general lighting systems and the controls are permanently installed nonresidential-rated lighting controls. When used for determining PAFs for general lighting in offices, furniture mounted luminaires that comply with all of the following conditions shall qualify as permanently installed general lighting systems: (§ 140.6(b)2C)
 - iv. Before multiplying the installed watts of the furniture mounted luminaire by the applicable PAF, 0.2 watts per square foot of the area illuminated by the furniture mounted luminaires shall be subtracted from installed watts of the furniture mounted luminaires
 - H. To qualify for the PAF for daylight continuous dimming plus OFF control, the daylight control and controlled luminaires shall comply with Section 130.1(d), 130.4(a)3 and 130.4(a)7, and the daylight control shall be continuous dimming and shall additionally turn lights completely OFF when the daylight available in the daylit zone is greater than 150 percent of the illuminance received from the general lighting system at full power. The PAF shall apply only to the luminaires in the primary sidelit daylit zone, secondary sidelit daylit zone and the skylit daylit zone.
 - I. To qualify for the PAF for an occupant sensing control controlling the general lighting in large office areas above workstations, in accordance with TABLE 140.6-A, the following requirements shall be met:
 - i. The office area shall be greater than 250 square feet:
 - K. To qualify for the PAF for a Demand Responsive Control in TABLE 140.6-A, the general lighting wattage receiving the PAF shall not be within the scope of Section 110.12(c) and a Demand Responsive Control shall meet all of the following requirements:
 - xii. The controlled lighting shall be capable of being automatically reduced in response to a demand response signal; and
 - xiii. General lighting shall be reduced in a manner consistent with uniform level of illumination requirements in TABLE 130.1-A