Topic Introduction

This guide will assist with the design of lighting systems and controls in nonresidential, high-rise residential, hotel/motel buildings, outdoor lighting, and electrical power distribution systems as well as your familiarity with the code. The requirements in this guide apply to newly constructed buildings as well as additions and alterations to existing buildings as indicated.

I. Manual Area Controls - §130.1(a)

A. Each area enclosed by ceiling-height partitions shall provide lighting controls that allow the lighting in that area to be manually turned on and off. The manual control shall:

1. Be readily accessible; and

a. *Exception*: Public restrooms having two or more stalls, parking areas, stairwells, and corridors may use a manual control not accessible to unauthorized personnel.

2. Be located in the same enclosed area with the lighting it controls; and

a. *Exception #1*: If the placement of the lighting controls in the same enclosed area poses a health and safety hazard (E.g. exposed to tampering by the public), the manual control may be located so that a person using the control can see the lights or area controlled by that control, or visually signal or display the current state of the controlled lighting (E.g. pilot light (a light indicating switch operation) and labelling)

(a) Example areas would include malls and atria, auditoriums, retail and wholesale areas, commercial/industrial storage, and psychiatric and secure areas in healthcare facilities.

b. *Exception #2*: In healthcare facilities, for restrooms and bathing rooms intended for a single occupant, the lighting control may be located outside the enclosed area but directly adjacent to the door.

3. Provide separate control of general, floor display, wall display, window display, case display, ornamental, and special effects lighting, such that each type of lighting be turned on or off without turning on or off other types of lighting, and without turning on or off any other equipment.

Manual Area Control Exception:

Up to 0.2 watts per square foot of indoor lighting may be continuously illuminated (24/7) to allow for means of egress illumination consistent with California Building Code Section 1008. Egress lighting complying with this wattage limitation is not required to comply with manual area control requirements if:

1. The area is designated for means of egress on the plans and specifications submitted to the enforcement agency under Section 10-103(a)2 of Part 1; and
2. The controls for the egress lighting are not accessible to unauthorized personnel.

The square footage of the area your egress path is in multiplied by 0.2 watts per square foot will give you your allowed wattage of continuously illuminated fixtures.
Multi-level control, shut-off control and daylighting control still applies to continuously illuminated fixtures unless exceptions are met in the following sections. This exception only applies to manual controls for the lighting circuit.

II. Multi-Level Lighting Controls – §130.1(b)

A. 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 multi-level lighting controls that allow the level of lighting to be adjusted up and down. The multi-level controls shall provide the number of control steps and meet the uniformity requirements specified in Table 130.1-A.

1. Note:

a. The multi-level connected lighting load only pertains to **General Lighting**. Do not include any display, ornamental, etc. lighting when calculating the watts per square foot.

b. **Both** the 100 square foot area or larger requirement and 0.5 watts per square foot or greater must be met for the Multi-level lighting control requirement to apply.

> ***Designer Note:***
> If you have a 5,000 square foot room and 0.45 watts per square foot of lighting, multi-level controls are not required as you do not meet both requirements.
> If you have a 75 square foot room and 3.5 watts per square foot, multi-level controls are not required as you still do not meet both requirements.

c. This section specifies only general lighting is affected. Therefore floor display, wall display, window display, case display, ornamental, and special effects lighting is not required to have multi-level lighting controls.

2. Exceptions to Multi-level Controls 130.1(b)

a. An area enclosed by ceiling height partitions that has only one luminaire with no more than two lamps.

b. Restrooms.

c. Healthcare Facilities.

***See next page for Table 130.1-A. Table only applies if Multi-Level Lighting Controls are required.**

The Table below shows Multi-Level Lighting Control requirements based on light fixture type.

TABLE 130.1-A MULTI-LEVEL LIGHTING CONTROLS AND UNIFORMITY REQUIREMENTS

<table>
<tr><th>Luminaire Type</th><th colspan="4">Minimum Required Control Steps (percent of full rated power[1])</th><th>Uniform level of illuminance shall be achieved by:</th></tr>
<tr><td>Line-voltage sockets except GU-24</td><td colspan="4" rowspan="4">Continuous dimming 10-100 percent</td><td></td></tr>
<tr><td>Low-voltage incandescent systems</td><td></td></tr>
<tr><td>LED luminaires and LED source systems</td><td></td></tr>
<tr><td>GU-24 rated for LED</td><td></td></tr>
<tr><td>GU-24 sockets rated for fluorescent > 20 watts</td><td colspan="4" rowspan="2">Continuous dimming 20-100 percent</td><td></td></tr>
<tr><td>Pin-based compact fluorescent > 20 watts[2]</td><td></td></tr>
<tr><td>GU-24 sockets rated for fluorescent ≤ 20 watts</td><td colspan="4" rowspan="3">Minimum one step between 30-70 percent</td><td>Stepped dimming; or
Continuous dimming; or
Switching alternate lamps in a luminaire</td></tr>
<tr><td>Pin-based compact fluorescent ≤ 20 watts[2]</td><td></td></tr>
<tr><td>Linear fluorescent and U-bent fluorescent ≤ 13 watts</td><td></td></tr>
<tr><td rowspan="2">Linear fluorescent and U-bent fluorescent > 13 watts</td><td colspan="4">Minimum one step in each range:</td><td rowspan="2">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</td></tr>
<tr><td>20-40 %</td><td>50-70 %</td><td>75-85 %</td><td>100 %</td></tr>
<tr><td>Track Lighting</td><td colspan="4">Minimum one step between 30 – 70 percent</td><td>Step dimming; or
Continuous dimming; or
Separately switching circuits in multi-circuit track with a minimum of two circuits.</td></tr>
<tr><td>HID > 20 watts</td><td colspan="4" rowspan="3">Minimum one step between 50 - 70 percent</td><td rowspan="3">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.</td></tr>
<tr><td>Induction > 25 watts</td></tr>
<tr><td>Other light sources</td></tr>
<tr><td colspan="6">1. Full rated input power of ballast and lamp, corresponding to maximum ballast factor
2. Includes only pin based lamps: twin tube, multiple twin tube, and spiral lamps</td></tr>
<tr><td colspan="6">EXCEPTION 1 to Table 130.1-A Minimum Required Control Steps: 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.
EXCEPTION 2 to Table 130.1-A Minimum Required Control Steps: Library stack aisles, aisle ways and open areas in warehouses, parking garages, parking areas, loading and unloading areas, stairwells, and corridors shall have a minimum of one control step between 20-60 percent of full rated power, regardless of luminaire type.</td></tr>
</table>

III. Automatic Shut-Off Controls – §130.1(c)

A. All installed indoor lighting shall be equipped with controls able to automatically reduce lighting power when the space is typically unoccupied.

a. *Exception to entire section*: Healthcare Facilities.

1. In addition to lighting controls installed to comply with Article I and II above (130.1(a) and 130.1(b)), all installed indoor lighting shall be equipped with controls that meet the following requirements:

a. Shall be controlled with an occupancy sensing control, automatic time-switch control, or other control capable of automatically shutting OFF all the lighting when the space is typically unoccupied; AND

b. Separate controls for the lighting on each floor, other than lighting in stairwells; AND

c. Separate controls for a space enclosed by ceiling height partitions not exceeding 5,000 square feet; AND

(a) *Exception to "c":* In the following function areas the area controlled may not exceed 20,000 square feet: Malls, auditoriums, single tenant retail, industrial, convention centers and arenas.

d. Separate controls for general, display, ornamental, and display case lighting; AND

e. For automatic time-switch controls, may include a manual-on mode. (See Section 3)

> ***Designer Note:***
> Section #1 requirements must be met unless exceptions listed below are met.
> The following Sections #2 through #7 explain which methods can be used to comply with Section #1 and what requirements are to be met with each.

***Exceptions to Paragraph 1*:**

a. *Exception #1*: Where the lighting is serving an area that is in continuous use, 24 hours per day/365 days per year.

b. *Exception #2*: Lighting complying with Sections #5 or #7 below.

c. *Exception #3*: Up to 0.1 watts per square foot of lighting in any area within a building may be continuously illuminated, provide that the area is designated for means of egress on the plans and specifications submitted to the enforcement agency under Section 10-103(a)2 of Part 1.

d. *Exception #4*: Electrical equipment rooms subject to Article 110.26(D) of the California Electrical Code.

e. *Exception #5*: Illumination provided by lighting equipment that is designated for emergency lighting, connected to an emergency power source or battery supply, and is intended to function in emergency mode only when normal power is absent.

> ***Exception #3 Note:***
> As opposed to the exception in Article I, Exception #3 only applies to automatic shut-off control regarding continuously illuminated fixtures along the path of egress.
> The difference between Article 1 and Article 3 is that Article 1 deals only with manual on/off area switching.
> Article 3 pertains to automatic on/off controls (e.g. timeclocks, occupancy/vacancy sensors).
> A room can be required to have an automatic on/off control, but no manual wall switch. On the other hand, a room can be required to have a manual on/off switch, but not automatic controls.

2. **Countdown timer switches may be used to comply with the automatic shut-OFF control requirements in Section III only in closets less than 70 square feet, and server aisles in server rooms. The maximum timer setting shall be 10 minutes for closets, and 30 minutes for server aisles:**

3. **If an automatic time-switch control, other than an occupant sensing control, is installed to comply with Section 1, it shall incorporate a manual override lighting control that:**
   a. Complies with Manual Area Controls, 130.1(a); AND
   b. Allows the lighting to remain ON for no more than 2 hours when an override is initiated. *Exception to (b): Override time may exceed 2 hours in Malls, auditoriums, single tenant retail, industrial, and arenas where captive-key override is utilized.*

> ***Designer Note:***
> Section #3 is stating that if you have a timeclock/contactor setup, an Override switch ***must*** be provided for lighting circuits not controlled via an occupancy sensing device unless not required by other portions of the code.

4. **If an automatic time-switch control, other than an occupant sensing control, is installed to comply with Paragraph #1 of Article III, it shall incorporate an automatic holiday "shut-OFF" feature that turns OFF all loads for at least 24 hours, and then resumes the normally scheduled operation:**
   Exception to Item #4: In retail stores and associated malls, restaurants, grocery stores, churches, and theaters, the automatic time-switch control is not required to incorporate an automatic holiday shut-OFF feature.

> ***Designer Note:***
> Sections #5, #6, and #7 below detail which areas must include a type of Occupancy Control and how they must function in the areas listed.

5. **Areas where occupancy sensing controls are required to shut OFF all lighting. 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 occupancy sensing controls to automatically shut OFF all of the lighting when the room is unoccupied.**
   a. In areas **required** by Article #2 to have Multi-Level Lighting Controls, the occupancy sensing controls shall function either as a:
      (a) Partial-ON Occupant Sensor capable of automatically activating between 50-70 percent of controlled lighting power, OR
      (b) Vacancy sensor, where all lighting responds to a manual ON input only.
   b. In areas **not required** by Article #2 to have Multi-Level Lighting Controls, the occupancy sensing controls shall function either as a:
      (a) Occupant Sensor; OR
      (b) Partial-ON occupancy sensor, OR
      (c) Vacancy sensor, where all lighting responds to manual ON input only.
   c. In addition, controls shall be provided that allow the lights to be manually shut-OFF in accordance with Article I - 130.1(a) regarding Manual Area Controls regardless of the sensor controls, as applicable.

6. **Areas where full or partial OFF occupant sensing controls are required. Lighting installed in the following areas shall meet the following requirements in addition to complying with Article I Manual Area Controls - 130.1(a).**
   a. In aisle ways and open areas in warehouses, lighting shall be controlled with occupancy sensing controls that automatically reduce lighting power by at least 50 percent when the areas are unoccupied. The occupant sensing controls shall independently control lighting in each aisle way, and shall not control lighting beyond the aisle way being controlled by the sensor.
      (a) Exception #1: In aisle ways and open areas in warehouses 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 lighting power by at least 40 percent.
      (b) *Exception #2: When metal halide lighting or high pressure sodium lighting is installed in warehouses, occupant sensing controls shall reduce lighting power by at least 40 percent.*
   b. In library book stack aisles 10 feet or longer that are accessible from only one end, and library book stack aisles 20 feet or longer that are accessible from both ends, lighting 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 independently control lighting in each aisle way, and shall not control lighting beyond the aisle way being controlled by the sensor.
   c. Lighting installed in corridors and stairwells shall be controlled by occupant sensing controls that separately reduce lighting power in each space by at least 50 percent when the space is 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.

7. **Areas where partial OFF occupant sensing controls are required. Lighting installed in the following areas shall meet the following requirements instead of complying with Article III, Section 1 – 130.1(c)1.**
   a. Lighting in stairwells and common area corridors that provide access to guestrooms and dwelling units of high-rise residential buildings and 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.
      (a) Exception #1: 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.
   b. In parking garages, parking areas and loading and unloading areas, general lighting shall be controlled by occupant sensing controls having at least one control step between 20 percent and 50 percent of design lighting power. No more than 500 watts of rated lighting power shall be controlled together as a single zone. A reasonably uniform level of illuminance shall be achieved in accordance with the applicable requirements in Table 130.1-A. 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. Interior areas of parking garages are classified as indoor lighting for compliance with this paragraph. Parking areas on the roof of a parking structure are classified as outdoor hardscape and shall comply with the applicable provisions in Section 130.2.

8. **Hotel/Motel guest rooms shall have captive card key controls, occupancy sensing controls, or automatic controls such that, no longer than 20 minutes after the guest room has been vacated, lighting power is switched off.**
   a. Exception #1: One high efficacy luminaire as defined in Table 150.0-A that is switched separately and where the switch is located within 6 feet of the entry door.
   b. Exception #2: Lighting providing means of egress illumination, as the term is used in the California Building Code, shall be configured to provide no less than the amount of light required by California Building Code Section 1008 while in the partial-off mode.

IV. Automatic Daylighting Controls – §130.1(d)

A. The general lighting in skylit daylit zones and primary sidelit daylit zones, as well as the general lighting in the combined primary and secondary sidelit daylit zones in parking garages, shall provide controls that automatically adjust the power of the installed lighting up and down (see Section 3 below) to keep the total light level stable as the amount of incoming daylight changes. For skylight 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.

1. All skylit daylit zones, primary sidelit daylit zones, and the combined primary and secondary sidelit daylit zones in parking garages shall be shown on the plans.

a. 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 luminaires in each type of daylit zone. Luminaires that fall in both a skylit and sidelit daylit zone shall be controlled as part of the skylit zone.

3. The automatic daylight controls shall:

a. For spaces required to install multi-level controls under Article II, adjust lighting via continuous dimming or the number of controls steps provided by the multi-level controls (Table 130.1-A);

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 percent; and

d. For parking garages, ensure that when 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, controlled lighting power consumption is zero.

4. When photosensors are located within the daylit zone, at least one photosensor shall be located so that they are not readily accessible to unauthorized personnel.

5. The location where calibration adjustments are made to the automatic daylighting controls shall be readily accessible to authorized personnel but may be inside a locked case or under a cover which requires a tool for access.

Note:
Primary daylit zones must be controlled separately from the secondary daylit zone. Both zones must also each be separately controlled from the general lighting of the Non-Daylit zones.

Designer Note:
What if I have an egress light eligible for continuous illumination in a daylight zone?
Only the egress light(s) in the daylight zone will still need to be automatically dimmed per daylighting control requirements.

Exceptions to Daylighting Controls:

Exception #1: Areas under skylights where it is documented that existing adjacent structures or natural objects block direct sunlight for more than 1,500 daytime hours per year between 8a.m. and 4p.m.

Exception #2: Areas adjacent to vertical glazing (glass) below an overhang, where the overhang covers the entire width of the vertical glazing, no vertical glazing is above the overhang, and the ratio of the overhand projection to the overhand rise is greater than 1.5 for South, East and West orientations or greater than 1.0 for North orientations.

Exception #3: 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 parking garage areas where the total combined general lighting power in the sidelit daylight zones is less than 60 watts.

Note to Exception #3:
This exception could be used for a vestibule to prevent the daylighting controls requirements if the occupancy is set to a different type than the space it enters to.
(This will not work unless the vestibule is its own entity with a ceiling to close it off from the rest of the space)

Exception #4: Rooms that have a total glazing area of less than 24 square feet, or parking garage areas with a combined total of less than 36 square feet of glazing or opening.

Exception #5: For parking garages, luminaires located in the daylight adaptation zone and luminaires for only dedicated ramps. Daylight adaptation zone and dedicated ramps are defined in Section 100.1.

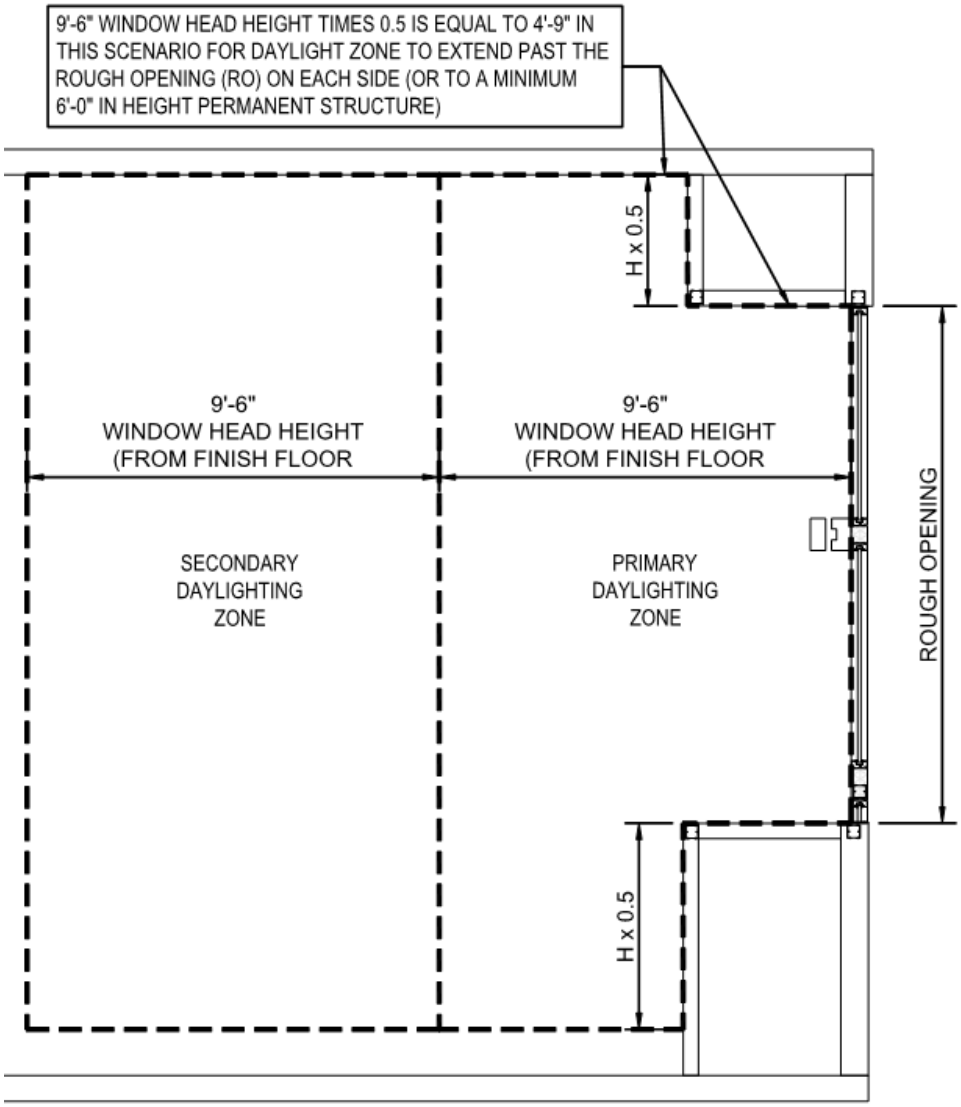
Exception #6: Luminaires in sidelit daylit zones in retail merchandize sales and wholesale showroom areas.

Note to Exception #6:
Daylighting controls still apply to Skylit Daylight Zones in Retail areas.

A. Calculating Sidelit Daylight Zones

1. The Primary Sidelit Daylit Zone is the area in a plan view directly adjacent to each vertical glazing, one window head height (Measured from finished floor to the top of the window) deep into the area, and window width plus 0.5 times window head height wide on each side of the rough opening of the window, minus any area on a plan beyond a permanent obstruction that is 6 feet or taller as measured from the floor.
2. The Secondary Sidelit Daylit Zone is the same as the Primary Sidelit Daylit Zone, but extended two times the window head height deep into the space.

B. The example below assumes a window head height of 9'-6", even if the actual window is 8'-0", the top window head height should be measured from the finished floor.



Designer Note:
Doors with glazing are to be counted as windows for daylight zone calculations.

V. Demand Responsive Controls & Management – §110.12

A. Demand Responsive Controls

1. **All demand responsive controls shall be either:**
   a. A certified OpenADR 2.0a or OpenADR 2.0b Virtual End Node (VEN), as specified under Clause 11, Conformance, in the applicable OpenADR 2.0 specification; OR
   b. Certified by the manufacturer as being capable of responding to a demand response signal from a certified OpenADR 2.0b Virtual End Node by automatically implementing the control functions requested by the Virtual End Node for the equipment it controls.
2. **All demand responsive controls shall be capable of communicating using one or more of the following: Wi-Fi, ZigBee, BACnet, Ethernet, or hard-wiring.**
3. **Demand responsive controls may incorporate and use additional protocols beyond those specified in Section 110.12(a)1 and 2.**
4. **When communications are disabled or unavailable, all demand responsive controls shall continue to perform all other control functions provided by the control.**
5. **Demand responsive control thermostats shall comply with Reference Joint Appendix 5 (JA5), Technical Specifications for Occupant Controlled Smart Thermostats.**

B. Demand Responsive Lighting Controls: Lighting controls in nonresidential buildings larger than 10,000 square feet shall be capable of automatically reducing lighting power in response to a Demand Response Signal. General lighting shall be reduced in a manner consistent with the uniform level of illumination requirements in Table 130.1-A

1. For compliance testing, the lighting controls shall demonstrate a lighting power reduction in controlled spaces of a minimum of 15 percent below the total installed lighting power. The controls may provide additional demand responsive functions or abilities.
   a. Exception #1: Spaces with a lighting power density of 0.5 watts per square foot or less are not required to install demand responsive controls and do not count towards the 10,000 square foot threshold.
   b. Exception #2: Spaces where a health or life safety statute, ordinance, or regulation does not permit the lighting to be reduced are not required to install demand responsive controls and do not count toward the 10,000 square foot threshold.

C. Demand Responsive Electronic Message Center Control: Controls for electronic message centers greater than 15 kW shall be capable of reducing the lighting power by a minimum of 30 percent when receiving a demand response signal.

Why Demand Responsive Lighting?

It helps with the operation of the electric grid by allowing the utility companies to reduce and/or shift electricity during peak periods in response to time-based rated or other forms of financial incentives.

VI. Outdoor Lighting Controls and Equipment – §130.2

B. Luminaire Cutoff 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 IES TM-15-11, Addendum A) requirements as follows:

1. Maximum zonal lumens for Backlight, Uplight, and Glare shall be in accordance with Title 24, Part 11, Section 5.106.8.

a. Exception #1: Signs.
b. Exception #2: Lighting for building facades, public monuments, statues, and vertical surfaces of bridges.
c. Exception #3: Lighting not permitted by a health or life safety statute, ordinance, or regulation to be a cutoff luminaire.
d. Exception #4: Temporary outdoor lighting.
e. Exception #5: Replacement of existing pole mounted luminaires in hardscape areas meeting all of the following conditions:
   (a) Where the existing luminaire does not meet the luminaire BUG requirements in Section 130.2(b); and
   (b) Spacing between existing poles is greater than six times the mounting height of the existing luminaire; and
   (c) Where no additional poles are being added to the site; and
   (d) Where new wiring to the luminaires is not being installed; and
   (e) Provided that the connected lighting power wattage is not increased.

VII. Sign Lighting Controls – §130.3

A. Nonresidential buildings other than healthcare facilities, high-rise residential buildings, and hotel/motel buildings shall comply with the applicable requirements of this section.

1. Indoor Signs.

a. All indoor sign lighting other than exit sign lighting shall be controlled with an automatic time-switch control or astronomical time-switch control.

2. Outdoor Signs.

a. All outdoor sign lighting shall be controlled with a photocontrol in addition to an automatic time-switch control, or an astronomical time-switch control.

(a) *Exception*: Outdoor signs in tunnels, and signs in large permanently covered outdoor areas that are intended to be continuously lit, 24 hours per day and 365 days per year.

b. All outdoor sign lighting that is ON both day and night shall be controlled with a dimmer that provides the ability to automatically reduce sign lighting power by a minimum of 65 percent during nighttime hours. Signs that are illuminated at night and for more than 1 hour during daylight hours shall be considered ON both day and night.

(a) *Exception*: Outdoor signs in tunnels and large covered areas that are intended to be illuminated both day and night.

3. Demand Responsive Electronic Message Center (EMC) Control.

a. See section 110.12 for requirements for demand responsive EMC controls.

VIII. Alterations – §141.0

A. Altered Indoor Lighting Systems: Alterations to indoor lighting systems that include 10% or more of the luminaires serving an enclosed space shall meet the requirements of 1, 2 or 3 below:

1. The alteration shall comply with the indoor lighting power requirements specified in Section 140.6 and the lighting control requirements specified in Table 141.0-F;
2. The alteration shall not exceed 80 percent of the indoor lighting power requirements specified in Section 140.6, and shall comply with the lighting control requirements specified in Table 141.0-F; **OR**
3. The alteration shall be a one-for-one luminaire alteration within a building or tenant space of 5,000 square feet or less, the total wattage of the altered luminaires shall be at least 40 percent lower compared to their total pre-alteration wattage, and the alteration shall comply with the lighting control requirements specified in Table 141.0-F.

B. Alterations to indoor lighting systems shall not prevent the operation of existing, unaltered controls, and shall not alter controls to remove functions specified in Section 130.1.

C. Alterations to lighting wiring are considered alterations to the lighting system. Alterations to indoor lighting systems are not required to separate existing general, floor, wall, display, or ornamental lighting on shared circuits or controls. New or completely replaced lighting circuits shall comply with the control separation requirements of Section 130.1(c)1D.

Exceptions to Alteration Requirements:

1. *Exception #1: Alteration of portable luminaires, luminaires affixed to moveable partitions, or lighting excluded as specified in Section 140.6(a)3.*
2. *Exception #2: Any enclosed space with only one luminaire.*
3. *Exception #3: Any alteration that would directly cause the disturbance of asbestos, unless the alteration is made in conjunction with asbestos abatement.*
4. *Exception #4: Acceptance testing requirements of Section 130.4 are not required for alterations where lighting controls are added to control 20 or fewer luminaires.*
5. *Exception #5: Any alteration limited to adding lighting controls or replacing lamps, ballasts, or drivers.*
6. *Exception #6: One-for-one luminaire alteration of up to 50 luminaires either per complete floor of the building or per complete tenant space, per annum.*

Designer Note:
If you were planning to say your completely new lighting system is an alteration because you're "altering" the existing space by adding lighting, the Code states "Spaces with lighting systems installed for the first time shall meet the requirements of Section 110.9, 130.0, 130.1, 130.2, 130.4, 140.3(c), 140.6, and 140.7.

Calculation Note:
Please note that when doing calculations for space alterations, only the affected area needs a calculation completed.
Using the Area Category Method, §140.6(c)2C states that an "area" is defined as all contiguous areas that accommodate or are associated with a single primary function area listed in Table 146.0-C.
§140.6(c)2B also states that Primary Function Areas shall not apply to a complete building. Each primary function area shall be determined as a separate area.

Table 141.0-F – Control Requirements for Indoor Lighting System Alterations

Control Specifications		**Projects complying with Section 141.0(b)2Ii**	**Projects complying with Sections 141.0(b)2Iii and 141.0(b)2Iiii**
Manual Area Controls	130.1(a)1	Required	Required
	130.1(a)2	Required	Required
	130.1(a)3	Only required for new or completely replaced circuits	Only required for new or completely replaced circuits
Multi-Level Controls	130.1(b)	Required	Not Required
Automatic Shut Off Controls	130.1(c)1	Required; 130.1(c)1D only required for new or completely replaced circuits	Required; 130.1(c)1D only required for new or completely replaced circuits
	130.1(c)2	Required	Required
	130.1(c)3	Required	Required
	130.1(c)4	Required	Required
	130.1(c)5	Required	Required
	130.1(c)6	Required	Required
	130.1(c)7	Required	Required
	130.1(c)8	Required	Required
Daylighting Controls	130.1(d)	Required	Not Required
Demand Responsive Controls	130.1(e)	Required	Not Required

IX. Power Distribution Systems – §130.5 (Form NRCC-ELC-E)

Non-residential, high-rise residential and hotel/motel buildings shall comply with the applicable requirements of Section 130.5(a) through 130.5(e).

A. Service Electrical Metering. Each electrical service or feeder shall have a permanently installed metering system which measures electrical energy use in accordance with Table 130.5A.

1. *Exception 1*: Service or feeder for which the utility company provides a metering system that indicates instantaneous kW demand and kWh for a utility-defined period.
2. *Exception 2*: Electrical power distribution systems subject to California Electrical Code Article 517.

Designer Note:
Section A does not apply to Addition/Alteration to feeders and branch circuits only or complete replacements to service equipment with no meter change.

B. Separation of Electrical Circuits for Electrical Energy Monitoring. Electrical power distribution systems shall be designed so that measurement devices can monitor the electrical energy usage of load types according to Table 130.5-B.

1. *Exception 1*: For each separate load types, up to 10 percent of the connected load may be of any types.
2. *Exception 2*: Electrical power distribution systems subject to California Electrical Code Article 517.

Designer Note:
Section B does not apply to Addition/Alteration to feeders and branch circuits only or replacement of a service meter only.

C. Voltage Drop. The maximum combined voltage drop on both installed feeder conductors and branch circuit conductors to the farthest connected load or outlet shall not exceed 5 percent.

1. *Exception 1*: Voltage drop permitted by California Electrical Code Sections 647.4, 695.6 and 695.7. (Sensitive Electronic Equipment and Fire Pumps)

D. Circuit controls for 120-volt Receptacles and Controlled Receptacles. In all buildings, both controlled and uncontrolled 120 volt receptacles shall be provided in office areas, lobbies, conference rooms, kitchen areas in office spaces, and copy rooms. Additionally, hotel/motel guest rooms shall comply with Section 130.5(d)4. Controlled receptacles shall meet the following requirements as applicable:

1. Install a control capable of automatically shutting OFF the controlled receptacles when the space is typically unoccupied, either at the receptacle or circuit level. When an automatic time switch control is installed it shall incorporate an override control that allows the controlled receptacle to remain ON for no more than 2 hours when an override is initiated and an automatic holiday "shut-OFF" feature that turns OFF all loads for at least 24 hours and then resumes the normally scheduled operation/ Countdown timer switches shall not be used to comply with the automatic time switch control requirements; AND

2. Install at least one controlled receptacle within 6 feet from each uncontrolled receptacle, or install a splitwired receptacle with at least one controlled and one uncontrolled receptacle. Where receptacles are installed in modular furniture in open office areas, at least one controlled receptacle shall be installed at each workstation; AND

3. Provide a permanent and durable marking for controlled receptacles or circuits to differentiate them from uncontrolled receptacles or circuits; AND

4. For hotel and motel guest rooms, install controlled receptacles for at least one-half of the 120-volt receptacles in each guestroom. Electric circuits serving controlled receptacles in guestrooms shall have captive card key controls, occupancy sensing controls, or automatic controls so the power is switched off no longer than 30 minutes after the guestroom has been vacated.
Note: A hardwired power strip controlled by an occupancy sensing control may be used to comply with Section 130.5(d). Plug-in strips and other plug-in devices shall not be used to comply with the requirements of this section.

a. *Exception 1*: Receptacles that are only for the following purposes:
   (a) Receptacles specifically for refrigerators and water dispensers in kitchen areas.
   (b) Receptacles located a minimum of six feet above the floor that are specifically for clocks.
   (c) Receptacles for network copiers, fax machines, A/V and data equipment other than personal computers in copy rooms.
   (d) Receptacles on circuits rated more than 20 amperes.
   (e) Receptacles connected to an uninterruptible power supply (UPS) that are intended to be in continuous use, 24 hours per day/365 days per year, and are marked to differentiate them from other uncontrolled receptacles or circuits.

b. *Exception 2*: Receptacles in healthcare facilities.

TABLE 130.5-A MINIMUM REQUIREMENTS FOR METERING OF ELECTRICAL LOAD

Metering Functionality	Electrical Services rated 50 kVA or less	Electrical Services rated more than 50kVA and less than or equal to 250 kVA	Electrical Services rated more than 250 kVA and less than or equal to 1000kVA	Electrical Services rated more than 1000kVA
Instantaneous (at the time) kW demand	Required	Required	Required	Required
Historical peak demand (kW)	Not required	Not required	Required	Required
Tracking kWh for a user-definable period.	Required	Required	Required	Required
kWh per rate period	Not required	Not required	Not required	Required

TABLE 130.5-B MINIMUM REQUIREMENTS FOR SEPARATION OF ELECTRICAL LOAD

Electrical Load Type	Electrical Services rated 50 kVA or less	Electrical Services rated more than 50kVA and less than or equal to 250 kVA	Electrical Services rated more than 250 kVA and less than or equal to 1000kVA	Electrical Services rated more than 1000kVA
Lighting including exit and egress lighting and exterior lighting	Not required	All lighting in aggregate	All lighting disaggregated by floor, type or area	All lighting disaggregated by floor, type or area
HVAC systems and components including chillers, fans, heaters, furnaces, package units, cooling towers, and circulation pumps associated with HVAC	Not required	All HVAC in aggregate	All HVAC in aggregate and each HVAC load rated at least 50 kVA	All HVAC in aggregate and each HVAC load rated at least 50kVA
Domestic and service water system pumps and related systems and components	Not required	All loads in aggregate	All loads in aggregate	All loads in aggregate
Plug load including appliances rated less than 25 kVA	Not required	All plug load in aggregate Groups of plug loads exceeding 25 kVA connected load in an area less than 5000 sf	All plug load separated by floor, type or area Groups of plug loads exceeding 25 kVA connected load in an area less than 5000 sf	All plug load separated by floor, type or area All groups of plug loads exceeding 25 kVA connected load in an area less than 5000 sf
Elevators, escalators, moving walks, and transit systems	Not required	All loads in aggregate	All loads in aggregate	All loads in aggregate
Other individual non-HVAC loads or appliances rated 25kVA or greater	Not required	All loads in aggregate	All loads in aggregate	All loads in aggregate
Industrial and commercial load centers 25 kVA or greater including theatrical lighting installations and commercial kitchens	Not required	All loads in aggregate	All loads in aggregate	All loads in aggregate
Renewable power source (net or total)	Each group	Each group	Each group	Each group
Loads associated with renewable power source	Not required	All loads in aggregate	All loads in aggregate	All loads in aggregate
Charging stations for electric vehicles	All loads in aggregate	All loads in aggregate	All loads in aggregate	All loads in aggregate

X. Common Questions

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