California Energy Commission
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SECTION 130.1 – MANDATORY INDOOR LIGHTING CONTROLS ~~THAT SHALL BE INSTALLED~~

Nonresidential, high-rise residential and hotel/motel buildings shall comply with the applicable requirements of Sections 130.1(a) through 130.1(e).

(a) Area Controls.

1. All luminaires shall be functionally controlled with ~~manually switched~~manual ON and OFF lighting controls. Each area enclosed by ceiling-height partitions shall be independently controlled.

This exception does not belong under (a). It belongs to (c). And make the LPD consistent with (c)1 Exception 3.

EXCEPTION to Section 130.1(a)1: Up to 0.2 watts per square foot of lighting in any area within a building may be continuously illuminated ~~during occupied times~~ to allow for ~~emergency~~ means of egress illumination, if:

A. The area is designated ~~an emergency~~for means of egress ~~area~~ on the plans and specifications submitted to the enforcement agency under Section 10-103(a)2 of Part 1; and

OR

B. The controls ~~switches~~ for the egress lighting are not accessible to unauthorized personnel.

2. The lighting controls shall meet the following requirements:

A. Be readily accessible; and

B. Be operated with a manual ~~switch~~ control that is located in the same room or area with the lighting that is controlled by that lighting control~~; and~~

~~C. If controlling dimmable luminaires, be a dimmer switch that allows manual ON and OFF functionality, and is capable of manually controlling lighting through all lighting control steps that are required in Section 130.1(b)~~.

EXCEPTION 1 to Section 130.1(a)2: In malls and atria, auditorium areas, retail merchandise sales areas, ~~and~~ wholesale ~~sales floors~~ showroom areas, commercial and industrial storage areas, general commercial and industrial work areas~~industrial facilities~~, convention centers, and arenas, the lighting control shall be located so that a person using the lighting control can see the lights or area controlled by that lighting control, or so that the area being lit is annunciated.

not in TABLE 140.6C

Add "stairwell" to TABLE 140.6-C

EXCEPTION 2 to Section 130.1(a)2: Public restrooms having two or more stalls, parking areas, stairwells and corridors may use a manual ~~switch~~ control not accessible to unauthorized personnel.

Add remote annunciation

3. **Other Lighting Controls.**

A. Other lighting controls may be installed in addition to the manual lighting controls provided they do not override the functionality of controls installed in accordance with Section 130.1(a)1, 2, or 4.

4. **Separately Controlled Lighting Systems.** In addition to the requirements in Section 130.1(a)1, 2, and 3:

A. General lighting shall be separately controlled from all other lighting systems in an area.

displays

B. Floor ~~and~~ displays wall display, window display, case display, ornamental, and special effects lighting shall each be separately controlled on circuits that are 20 amps or less.

Make this line consistent with (c)1 B.

C. When track lighting is used, general, display, ornamental, and special effects lighting shall each be separately controlled.

Make this EXCEPTION 1.

(b) **Multi-Level Lighting Controls.** The general lighting of any enclosed area for 100 square feet or larger, with a connected lighting load that exceeds 0.5 watts per square foot shall provide multi-level lighting control that meets the following requirements:

Make this EXCEPTION 2.

1. Lighting shall have the required number of control steps and meet the uniformity requirements in accordance with TABLE 130.1-A; ~~and~~

2. Multi-level lighting controls shall not override the functionally of other lighting controls required for compliance with Sections 130.1(a), ~~and~~ (c) ~~through~~ (d) and (e); and

3. ~~Each luminaire shall be controlled by at least of one of the following methods:~~Dimmable luminaires shall be controlled by a dimmer ~~switch~~ control that is capable of controlling lighting through all required lighting control steps and that allows the manual ON and OFF functionality required by Section 130.1(a) ~~and is additionally capable of manually controlling lighting through all required lighting control steps~~.

~~A. Manual dimming meeting the applicable requirements of Section 130.1(a)~~

~~B. Lumen maintenance as defined in Section 100.1~~

~~C. Tuning as defined in Section 100.1~~

~~D. Automatic daylighting controls in accordance with Section 130.1(d)~~

~~E. Demand responsive lighting controls in accordance with Section 130.1(e)~~

#3 **EXCEPTION ~~1~~ to Section 130.1(b):** Classrooms~~,~~ with a connected general lighting load of 0.7 watts per square feet ~~and~~ or less~~,~~ and public restrooms shall have at least one control step between 30-70 percent of full rated power.

#4 **EXCEPTION ~~2~~ to Section 130.1(b):** An area enclosed by ceiling height partitions that has only one luminaire with no more than two lamps.

#5 **EXCEPTION ~~3~~ to Section 130.1(b):** The areas specified in Sections 130.1(c)6 and 7 are not also required to meet the requirements of Section 130.1(b).

(c) **Shut-OFF Controls**

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

   A. Shall be controlled with an occupant sensing control, automatic time-switch control, ~~signal from another building system,~~ or other control capable of automatically shutting OFF all of 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

   EXCEPTION to Section 130.1(c)1C: 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,

   Make this line consistent with (a) 4 B

   D. Separate controls for general, display, ornamental, ~~and~~ display case and special effects lighting.

   EXCEPTION 1 to Section 130.1(c)1: Where the lighting is serving an area that is in continuous use, 24 hours per day/365 days per year.

   EXCEPTION 2 to Section 130.1(c)1: Lighting complying with Section 130.1(c)5, 6, or 7.

   Make the LPD consistent with (a) 1 Exception.

   EXCEPTION 3 to Section 130.1(c)1: ~~In office buildings, u~~Up to ~~0.05~~0.1 watts per square foot of lighting in any area within a building may be continuously illuminated, provided that the area is designated ~~an emergency~~for means of egress ~~area~~ on the plans ~~and~~ OR specifications submitted to the enforcement agency under Section 10-103(a)2 of Part 1.

   EXCEPTION 4 to Section 130.1(c)1: Electrical equipment rooms subject to Article 110.26(D) of the California Electrical Code.

   EXCEPTION 5 to Section 130.1(c): Illumination provided by lighting equipment~~s~~ 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.

2. Countdown timer switches shall not be used to comply with the automatic shut-OFF control requirements in Section 130.1(c)1.

   EXCEPTION 1 to Section 130.1(c)2: Single-stall bathrooms less than 70 square feet, and closets less than 70 square feet may use countdown timer switches with a maximum setting capability of ten minutes to comply with the automatic shut-Off requirements.

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EXCEPTION 2 to Section 130.1(c)2: Lighting in a Server Aisle in a Server Room, as defined in Section 100.1, may use countdown timer switches with a maximum setting capability of 30 minutes to comply with the automatic shut-OFF requirements.

3. If an automatic time-switch control, other than an occupant sensing control, is installed to comply with Section 130.1(c)1, it shall incorporate an override lighting control that:

   A. Complies with Section 130.1(a); and

   B. Allows the lighting to remain ON for no more than 2 hours when an override is initiated.

   EXCEPTION to Section 130.1(c)3B: In the following function areas, the override time may exceed 2 hours: Malls, auditoriums, single tenant retail, industrial, and arenas where captive-key override is utilized. convention centers

4. If an automatic time-switch control, other than an occupant sensing control, is installed to comply with Section 130.1(c)1, 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 Section 130.1(c)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.

   places of worship

5. **Areas where Occupant 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, and conference rooms of any size, lighting shall be controlled with occupant sensing controls to automatically shut OFF all of the lighting when the room is unoccupied.

   30% lighting power is equal to 57% perceived brightness, and will make it consistent with Exception 1 to Sec 130.1(b).

   In areas required by Section 130.1(b) to have multi-control lighting controls, the occupant sensing controls shall function either as a:

   A. Partial-ON Occupant Sensor capable of automatically activating between 30 ~~50~~-70 percent of controlled lighting power, or

   B. Vacancy Sensor, where all lighting responds to a manual ON input only.

   In areas not required by Section 130.1(b) to have multi-control lighting controls, the occupant sensing controls shall function either as a:

   A. Occupant Sensor; or

   B. Partial-ON Occupant Sensor, or

   C. Vacancy Sensor, where all lighting responds to a manual ON input only.

   In addition, controls shall be provided that allow the lights to be manually shut-OFF in accordance with Section 130.1(a) regardless of the sensor status.

   ~~**EXCEPTION to Section 130.1(c)5A:** Areas that are not required by Section 130.1(b) to have multi-level lighting controls may instead use occupant sensing controls that function as any Occupant Sensor or Vacancy Sensor.~~

6. **Areas where full or partial ~~ON/~~OFF occupant sensing controls are required.** ~~Multi-level]~~ lighting installed in the following areas shall meet the following requirements in addition to complying with Section 130.1(c)1.

   A. In aisle ways and open areas in warehouses, 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.

   allow this Exception to also apply to (c)6B and (c)6C

   EXCEPTION 1 to Section 130.1(c)6A: 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.

   EXCEPTION 2 to Section 130.1(c)6A: ~~When~~ Where metal halide lighting or high pressure sodium lighting is installed in warehouses, occupant sensing controls shall reduce lighting power by at least 40 percent.

   Consider making this consistent with Exception to Sec 130.1(c)7b

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 the 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.

Use parallel sentence construction

7. **Areas where partial ~~ON/OFF~~ occupant sensing controls are required.** ~~Multi-level L~~ighting installed in the following areas shall meet the following requirements instead of complying with Section 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.

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.

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 Section 130.1(c)7B. 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.

EXCEPTION to Section 130.1(c)7B: Metal halide luminaires with a lamp plus ballast mean system efficacy of greater than 75 lumens per watt, used for general lighting in parking garages, parking areas and loading and unloading areas, shall be controlled by occupant sensing controls having at least one control step between 20 percent and 60 percent of design lighting power.

Consider making this consistent with Exception to Sec 130.1(c)6A.

8. Hotel motel guest rooms shall have captive card key controls, occupancy sensing controls, or automatic controls such that, no longer than 30 minutes after the guest room has been vacated, lighting power is switched off.

EXCEPTION to Section 130.1(c)8: One high efficacy luminaire as defined in TABLE 150.0-A ~~or 150.0-B~~ that is switched separately and where the switch is located within 6 feet of the entry door.

(d) **Automatic Daylighting Controls.**

1. Daylit Zones shall be defined as follows:

A. **SKYLIT DAYLIT ZONE** is the rough area in plan view under each skylight, plus 0.7 times the average ceiling height in each direction from the edge of the rough opening of the skylight, minus any area on a plan beyond a permanent obstruction that is taller than the following: A permanent obstruction that is taller than one-half the distance from the floor to the bottom of the skylight. The bottom of the skylight is measured from the bottom of the skylight well for skylights having wells, or the bottom of the skylight if no skylight well exists.

For the purpose of determining the skylit daylit zone, the geometric shape of the skylit daylit zone shall be identical to the plan view geometric shape of the rough opening of the skylight; for example, for a rectangular skylight the skylit daylit zone plan area shall be rectangular, and for a circular skylight the skylit daylit zone plan area shall be circular.

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B. **PRIMARY SIDELIT DAYLIT ZONE** is the area ~~on a plan~~in plan view and is directly adjacent to each vertical glazing, one window head height 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.

C. **SECONDARY SIDELIT DAYLIT ZONE** is the area ~~on a plan~~in plan view and is directly adjacent to each vertical glazing, two window head heights 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.

Note: Modular furniture walls shall not be considered a permanent obstruction.

2. Luminaires providing general lighting that are in or are partially in the Skylit Daylit Zones or the Primary Sidelit Daylit Zones shall be controlled independently by fully functional automatic daylighting controls that meet the applicable requirements of Section 110.9, and the applicable requirements below:

A. All Skylit Daylit Zones and Primary Sidelit Daylit Zones shall be shown on the plans.

B. Luminaires in the Skylit Daylit Zone shall be controlled separately from those in the Primary Sidelit Daylit Zones.

C. Luminaires that fall in both a Skylit and Primary Sidelit Daylit Zone shall be controlled as part of the Skylit Daylit Zone.

D. **Automatic Daylighting Control Installation and Operation**. For luminaires in daylight zones, automatic daylighting controls shall be installed and configured to operate according to all of the following requirements:

i. Photosensors shall be located so that they are not readily accessible to unauthorized personnel.~~, and t~~The location where calibration adjustments are made to automatic daylighting controls shall ~~not~~ be readily accessible to ~~un~~authorized personnel and may be inside a locked case or under a cover which requires a tool for access.

needs definition

ii. Automatic daylighting controls shall provide functional multilevel lighting having at least the number of control steps specified in TABLE 130.1-A.

EXCEPTION 1 to Section 130.1(d)2Dii: Controlled lighting having a lighting power density less than 0.3 W/ft^2 is not required to provide multilevel lighting controls.

Please clarify if this means daylighting control is not required for LPD <0.3 w/sf

~~**EXCEPTION 2 to Section 130.1(d)2Dii:** When skylights are replaced or added to an existing building where there is an existing general lighting system that is not being altered, multilevel lighting controls are not required.~~

iii. For each space, the combined illuminance from the controlled lighting and daylight shall not be less than the illuminance from controlled lighting when no daylight is available.

iv. In areas served by lighting that is daylight controlled, when the combined illuminance ~~received from the daylight~~ 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.

use consistent term

EXCEPTION 1 to Section 130.1(d)2: 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.

EXCEPTION 2 to Section 130.1(d)2: Rooms that have a total glazing area of less than 24 square feet.

EXCEPTION 3 to Section 130.1(d)2: Parking garages complying with Section 130.1(d)3.

3. **Parking Garage Daylighting Requirements**. In a parking garage area with a combined total of 36 square feet or more of glazing or opening, luminaires providing general lighting that are in the combined primary and secondary sidelit daylit zones shall be controlled independently from other lighting in the parking garage by automatic daylighting controls, and shall meet the following requirements as applicable:

Please Clarify whether the primary zone and secondary zone are to be combined into one zone of control.

A. All primary and secondary sidelit daylit zones shall be shown on the plans.

B. Automatic Daylighting Control Installation and Operation. Automatic daylighting control shall be installed and configured to operate according to all of the following requirements:

i. Automatic daylighting controls shall have photosensors that are located so that they are not readily accessible to unauthorized personnel~~. and t~~The location where calibration adjustments are made to the automatic daylighting controls shall ~~not~~ be readily accessible to ~~un~~authorized personnel but may be inside a locked case or under a cover which requires a tool for access.

ii. Automatic daylighting controls shall be multilevel, continuous dimming or ON/OFF.

iii. The combined illuminance from the controlled lighting and daylight shall not be less than the illuminance from controlled lighting when no daylight is available.

iv. When the combined ~~primary sidelit zones receive~~ illuminance ~~levels~~ or measured at the farthest edge of the secondary sidelit zone away from the glazing of opening ~~xe~~ as greater than 150 percent of the illuminance provided by the controlled lighting when no daylight is available, the controlled lighting power consumption shall be zero.

EXCEPTION 1 to Section 130.1(d)3: Luminaires located in the daylight transition zone and luminaires for only dedicated ramps. Daylight transition zone and dedicated ramps are defined in Section 100.1.

EXCEPTION 2 to Section 130.1(d)3: The total combined general lighting power in the primary sidelit daylight zones is less than 60 watts.

(e) **Demand Responsive Controls.**

1. ~~Lighting power in b~~Buildings larger than 10,000 square feet~~.~~, excluding spaces with a lighting power density of 0.5 watts per square foot or less, shall be capable of ~~being~~ automatically reduc~~ed~~ing lighting power in response to a Demand Response Signal; so that the ~~building's~~ total lighting power of non-excluded spaces can be lowered by a minimum of 15 percent below the total installed lighting power when a Demand Response Signal is received. Lighting shall be reduced in a manner consistent with uniform level of illumination requirements in TABLE 130.1-A.

~~Spaces that are non-habitable shall not be used to comply with this requirement, and spaces with a lighting power density of less than 0.5 watts per square foot shall not be counted toward the building's total lighting power~~.

EXCEPTION to Section 130.1(e): Lighting not permitted by a health or life safety statute, ordinance, or regulation to be reduced and lighting in non-habitable spaces shall not be counted toward the total lighting power.

2. Demand responsive controls and equipment shall be capable of receiving and automatically responding to at least one standards-based messaging protocol by enabling demand response after receiving a demand response signal.

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

Luminaire Type	Minimum Required Control Steps (percent of full rated power[1])				Uniform level of illuminance shall be achieved by:
Line-voltage sockets except GU-24	Continuous dimming 10-100 percent				
Low-voltage incandescent systems					
LED luminaires and LED source systems					
GU-24 rated for LED sockets					
GU-24 sockets rated for fluorescent > 20 watts	Continuous dimming 20-100 percent				
Pin-based compact fluorescent > 20 watts[2]					
GU-24 sockets rated for fluorescent ≤ 20 watts	Minimum one step between 30-70 percent				Stepped dimming; or Continuous dimming; or Switching alternate lamps in a luminaire
Pin-based compact fluorescent ≤ 20 watts[2]					
Linear fluorescent and U-bent fluorescent ≤ 13 watts					
Linear fluorescent and U-bent fluorescent > 13 watts	Minimum one step in each range:				Stepped dimming; or Continuous dimming; or ~~s~~Switching alternate lamps in each luminaire, having a minimum of 4 lamps per luminaire~~,~~ illuminating the same area and in the same manner
	20-40 %	50-70 %	~~80~~75-85 %	100 %	
Track Lighting	Minimum one step between 30 – 70 percent				Step dimming; or Continuous dimming; or Separately switching circuits in multi-circuit track with a minimum of two circuits.
HID > 20 watts	Minimum one step between 50 - 70 percent				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 watts					
Other light sources					

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