



# **2019 Energy Code –**

## **Nonresidential Indoor Lighting**

California Energy Commission



# The 2019 Energy Code

- **Effective January 1, 2020**
  - Based on date of application for building permit
- **30% more efficient** than 2016 Code (nonresidential)
- **Applies to occupancy groups:**
  - A, B, E, F, H, I, M, R, S, and U
  - I-1 and I-2 (healthcare facilities)
  - **Does not apply to I-3, I-4, L (Institution and Labs)**
- **Sections applicable to nonresidential lighting**
  - 110.9, 110.12, 130.0-130.4, 140.6-140.8, 141.0(b)2I-L
- **Sections applicable to residential lighting**
  - 110.9, 130.0, 150.0(k)



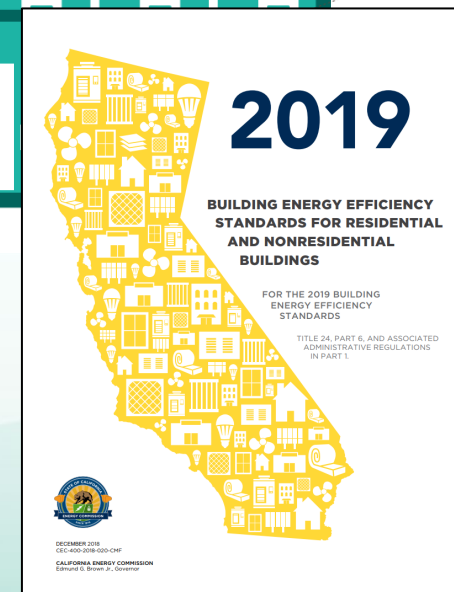
## HEALTHCARE FACILITIES

For the first time, energy efficiency standards extend to newly constructed healthcare facilities and incorporates the appropriate application of standards.



## LIGHTING

Update indoor and outdoor lighting values to assume the use of LED lighting. LED lights use little energy and will save money on monthly electricity bills meaning smaller operating budgets for commercial buildings. Maintenance costs are reduced because bulbs do not need to be changed as often. The standards also add occupancy sensing requirements for restrooms.

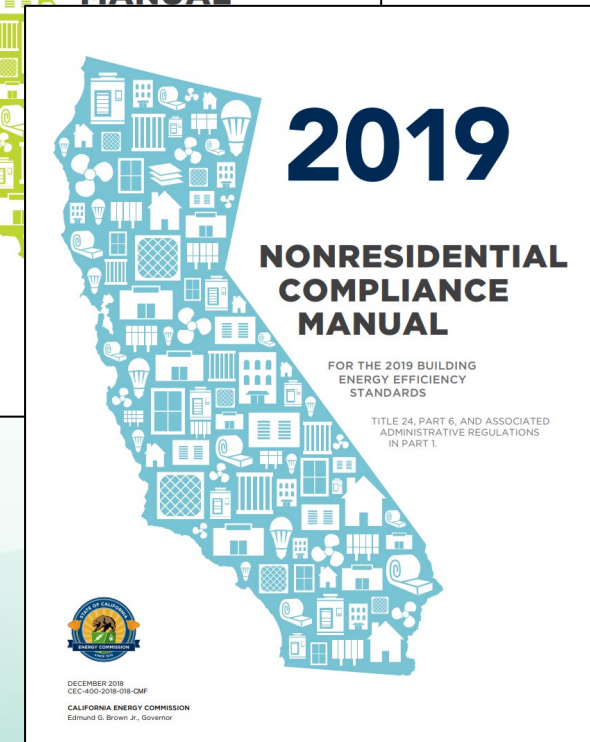






# Residential Lighting in Nonresidential Buildings

- Which lighting must **meet the residential requirements** in nonresidential buildings?
  - High-rise residential dwelling units
  - Hotel and motel guestrooms
    - Additional controlled receptacle and captive card key or auto shut-off control requirements
  - Fire station dwelling accommodations
  - Dormitory and senior housing dwelling accommodations
  - Outdoor lighting attached to high-rise residential or hotel and motel buildings that is separately controlled from inside the dwelling or guest room





# **Nonresidential Indoor Lighting Mandatory Measures**



# 130.0 Luminaire Classification of Power

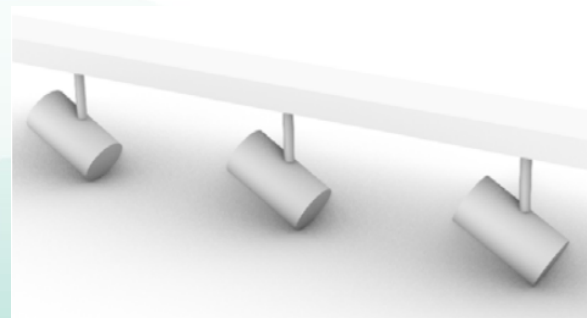
- **Recessed luminaires with line voltage medium screw base lamp holders**
  - 50 watts per socket; or
  - Rated wattage of installed JA8 compliant lamps
- **LED tape lighting**
  - Maximum rated input wattage of power supply or driver; or
  - Installed length multiplied by manufacturer rated linear watts/ft
- **Modular lighting systems** power is the greater of:
  - 30 watts per linear foot; or
  - Rated wattage of all luminaires in the system



Source: © 2018 Lutron Electronics Co., Inc. All rights Reserved



Source: NORA Lighting





# 130.1(a) Area Controls (ON/OFF)

- Manual area controls required in each space
- Controls must be readily accessible
- Controls must be located within the same space as lights being controlled
- Separate control for general, display, ornamental, and special effects lighting





# 130.1(a) Area Controls (ON/OFF) Exceptions

- Controls **do not** need to be **readily accessible**:
  - Public restrooms (2 ≥ stalls)
  - Parking areas
  - Stairwells
  - Corridors
- **Controls do not need to be located in the same space**: malls, atria auditoriums, retail sales, storage, commercial and industrial work areas, convention, arenas, psychiatric and secure areas in healthcare facilities, **other areas that pose a health and safety hazard**
- **Restrooms in healthcare facilities intended for a single occupant**: control can be located outside of the enclosed area but adjacent to the door
- **Egress Lighting**: up to 0.2 W/ft<sup>2</sup> may be continuously illuminated if the area is designated means of egress and controls are not readily accessible





# 130.1(b) Multilevel Controls

- Required for **General lighting**:
  - Enclosed spaces  $\geq 100 \text{ ft}^2$ ; and
  - $\text{LPD} > 0.5 \text{ W/ft}^2$
- The number of control steps is based on luminaire type per **TABLE 130.1-A**
  - LED luminaires – continuous dimming
  - Linear fluorescent – step or continuous dimming

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

Luminaire Type	Minimum Required Control Steps (percent of full rated power <sup>1</sup> )	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					
GU-24 sockets rated for fluorescent > 20 watts		Continuous dimming 20-100 percent			
Pin-based compact fluorescent > 20 watts <sup>2</sup>					
GU-24 sockets rated for fluorescent $\leq 20$ watts	Minimum one step between 30-70 percent	Stepped dimming; or Continuous dimming; or Switching alternate lamps in a luminaire			
Pin-based compact fluorescent $\leq 20$ watts <sup>2</sup>					
Linear fluorescent and U-bent fluorescent $\leq 13$ watts					
Linear fluorescent and U-bent fluorescent > 13 watts	Minimum one step in each range:				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
	20-40 %	50-70 %	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

**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.





# 130.1(b) Multilevel Controls Exceptions

- **Exceptions:**
  - Enclosed spaces with one luminaire and no more than two lamps
  - Restrooms
  - Healthcare facilities
- **Exceptions** (see footnotes of TABLE 130.1-A):
  - Classrooms with general lighting load  $\leq 0.7$  W/ft<sup>2</sup>
  - Open areas and aisle ways in warehouses, library stack aisles, corridors, stairwells, parking garages/areas require at least one control step between 20-60%



# 130.1(c)1, 3, 4 Shut-OFF Controls

- All indoor lighting must have an automatic shut-OFF control
  - **Occupant sensing** or **automatic time-switch** with 2 hour override and holiday shut-off feature
  - Separate controls for each floor other than stairwells
  - Separate controls for up to 5,000 ft<sup>2</sup> in an enclosed space
    - Up to 20,000 ft<sup>2</sup> in malls, auditoriums, retail, industrial, convention centers, arenas





# 130.1(c)1, 3, 4 Shut-OFF Controls Exceptions

- Continuous use spaces 24/7 year round
- Lighting complying with 130.1(c)5 or 7
- **Egress lighting:** Up to 0.1 W/ft<sup>2</sup> may be continuously illuminated if area is designated for means of egress on plans
- Electrical equipment rooms subject to CA Electrical Code
- **Emergency lighting:** connected to an emergency power source/battery and intended to function only when normal power is absent
- Healthcare facilities



# 130.1(c)5 Shut-OFF Controls

- Occupant sensors are required for:
  - Offices  $\leq 250$  ft<sup>2</sup>
  - Multipurpose rooms  $< 1,000$  ft<sup>2</sup>
  - Classrooms
  - Conference rooms
  - Restrooms



**If multilevel lighting controls required by 130.1(b)**

Partial-ON (activate 50-70% power);  
or  
Vacancy sensor

**If multilevel lighting controls not required by 130.1(b)**

Partial-ON; or  
Vacancy sensor; or  
Occupancy sensor (auto ON/OFF)





# 130.1(c)6 Shut-OFF Controls

- Areas requiring **full-OFF** or **partial-OFF** occupant sensing controls:
  - Aisle ways and open areas in warehouses
  - Library stack aisles depending on length
  - Corridors and stairwells
- Must also have an automatic shut-OFF control to turn the lighting off when the space is typically unoccupied (i.e., at night or outside of business hours)





# 130.1(c)7, 8 Shut-OFF Controls

- **130.1(c)7** - Areas requiring **partial-OFF** occupant sensing controls:
  - Stairwells and common area corridors in high-rise residential, and hotel and motel buildings. Lighting must automatically reduce by at least 50%
  - Parking garages, parking areas, loading areas. General lighting must have at least one control step between 20% to 50%
- **130.1(c)8** - Hotel and motel guest rooms must have an automatic control to turn lighting off after **30 minutes** of the room being vacated (captive key card, occupancy sensor)

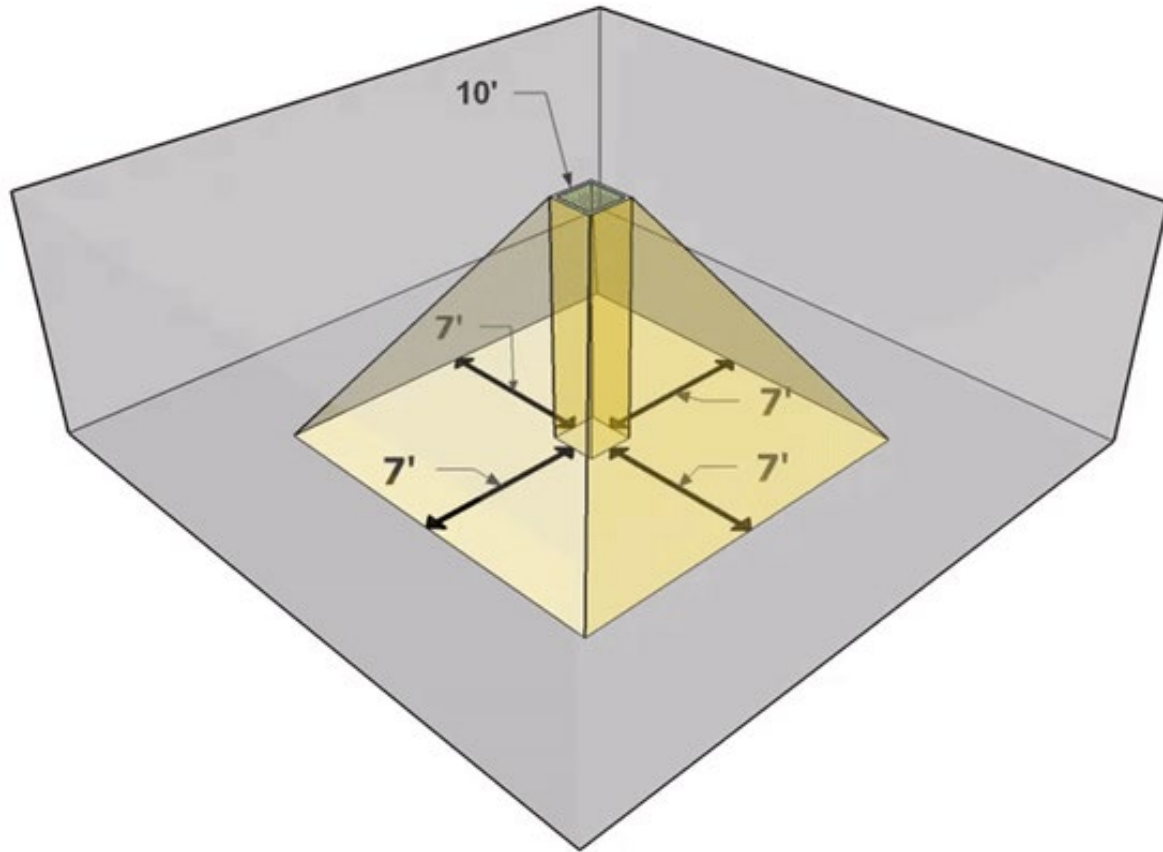


# 130.1(d) Daylighting Controls

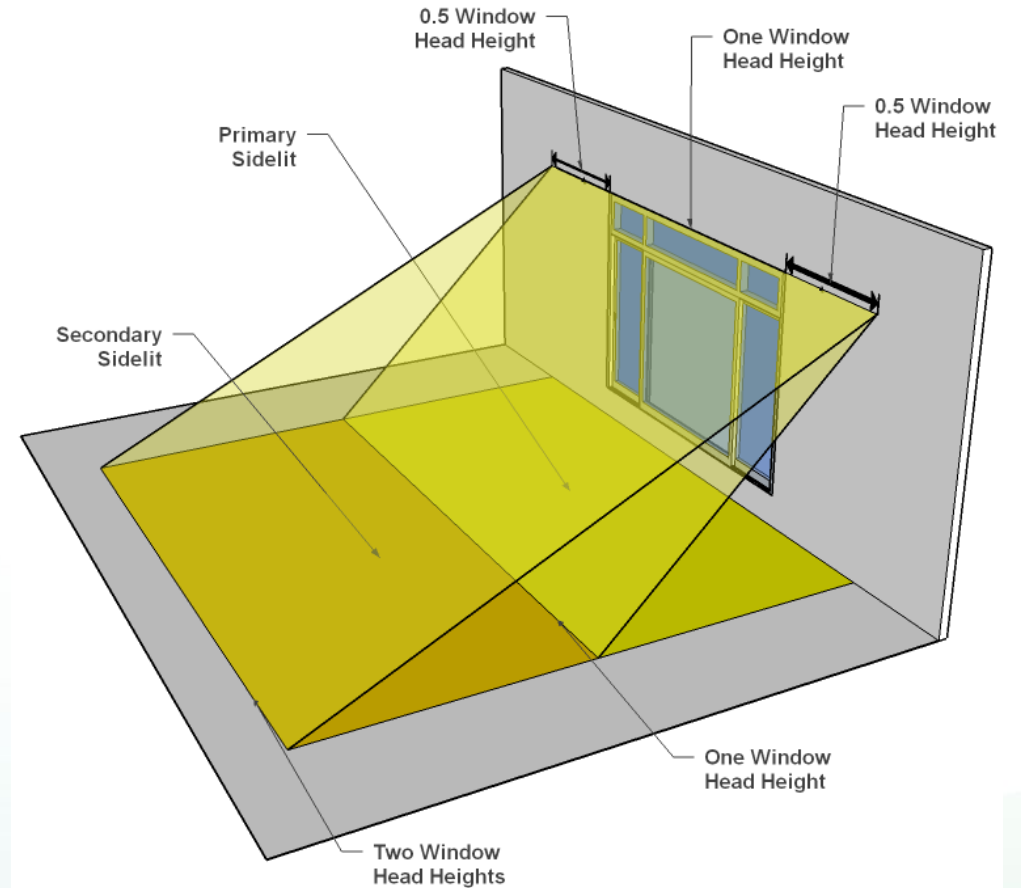
- **Automatic daylighting controls are required in spaces when:**
  - $\geq 24 \text{ ft}^2$  of glazing; and
  - $\geq 120$  watts of lighting in combined skylit, primary sidelit daylit zone per enclosed space
- **Requirements:**
  - Daylit zones must be shown on the plans
  - Automatically reduce general lighting within the daylit zone
  - Primary sidelit and skylit zone must be controlled separately
  - Adjust lighting via continuous dimming, or control steps provided by multilevel lighting control
  - Combined electric lighting and daylighting must be within 100% to 150% of design illuminance
  - When daylight illuminance is greater than 150% of design illuminance, reduce power by 65% or more



# 130.1(d) Daylighting Controls cont.



Skylit daylit zone



Sidelit daylit zones





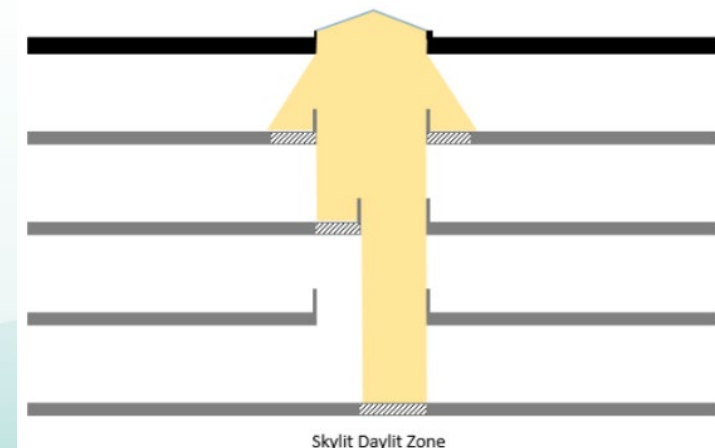
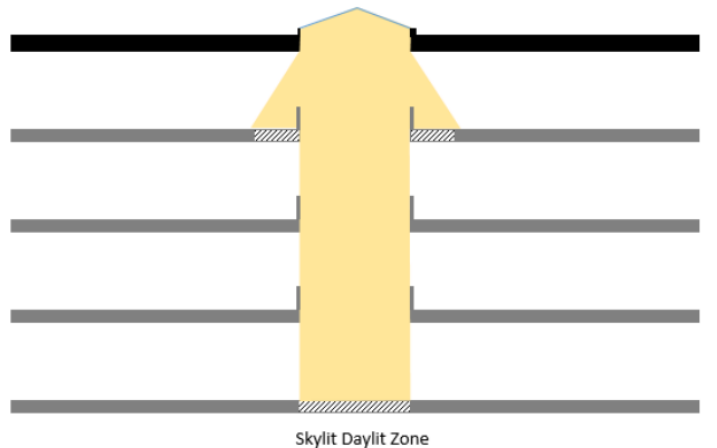
# 130.1(d) Daylighting Controls cont.

- **Parking garages** - automatic daylighting controls are required when:
  - $\geq 60$  watts of lighting in combined primary and secondary sidelit zones; and
  - $\geq 36$  ft<sup>2</sup> of glazing or opening
- **Requirements:**
  - Daylit zones must be shown on the plans
  - Automatically reduce general lighting within the combined primary and secondary sidelit daylit zone
  - Adjust lighting via continuous dimming, or control steps provided by multilevel lighting control
  - Combined electric lighting and daylighting must be within 100% to 150% of design illuminance
  - When illuminance is greater than 150% of design illuminance, turn lighting OFF



# 130.1(d) Daylighting Controls cont.

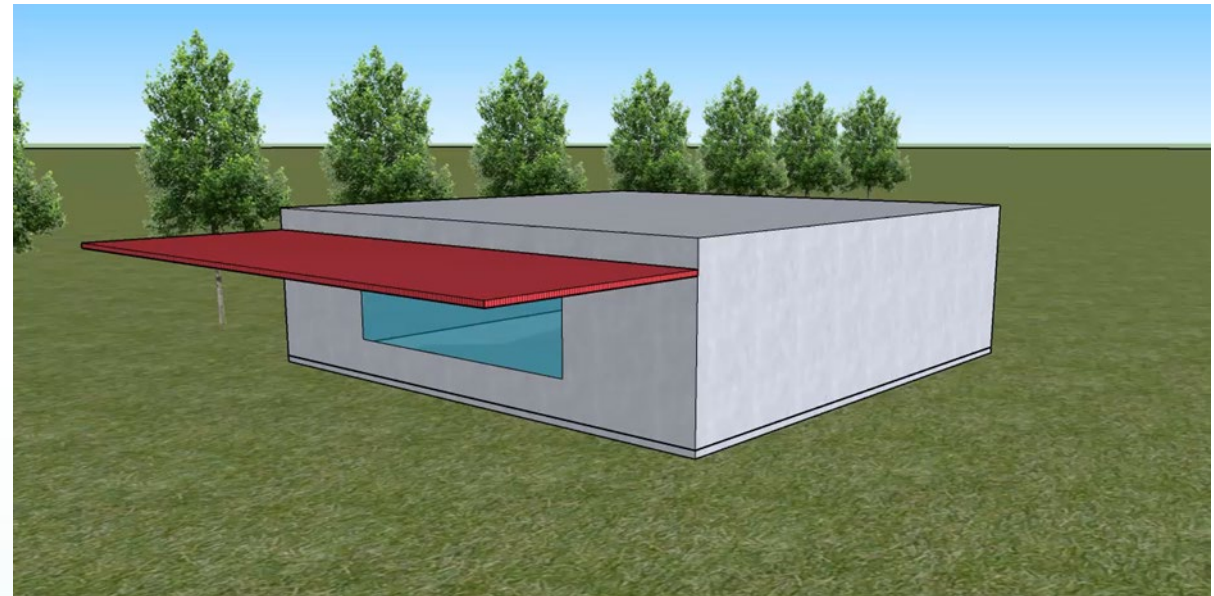
- **Exception:** sidelit daylit areas in retail sales and wholesale showroom areas
- **Exception:** skylit daylit zones where structure or natural objects block direct sunlight for more than 1,500 hours/year between 8a.m. – 4p.m.
- **Skylit daylit zone for atria** includes the floor area directly under the atrium and top floor area directly adjacent to atrium





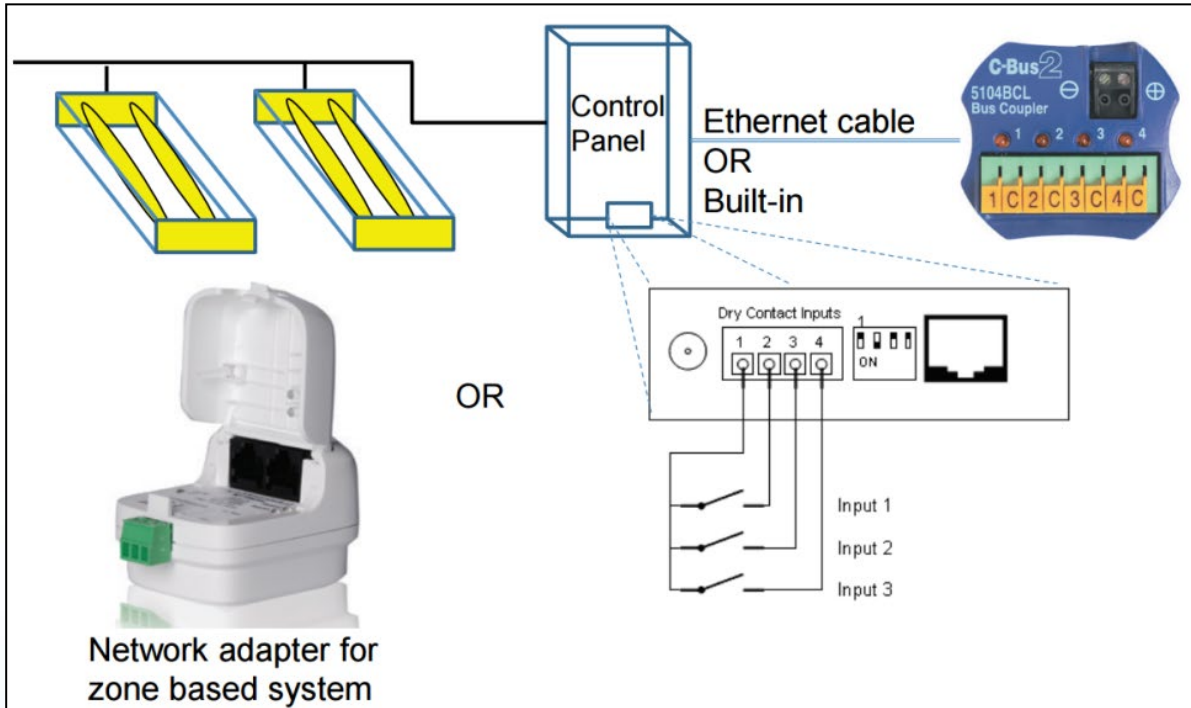
# 130.1(d) Daylighting Controls cont.

- **Exception:** sidelit zones with overhangs
  - Overhang that covers the entire width of vertical glazing; and
  - No vertical glazing above the overhang; and
  - Ratio of overhang projection to the overhang rise is greater than:
    - 1.5 for South, East, and West orientations
    - 1 for North orientations





# 130.1(e), 110.12 Demand Responsive Controls



- **Demand responsive (DR)** capable controls are required for buildings over 10,000 ft<sup>2</sup>
  - Certified OpenADR 2.0a or 2.0b. List available at: [OpenADR webpage](#)
  - Certified as being capable of responding to OpenADR 2.0b virtual end node
  - Capable of reducing total lighting power by minimum 15%
  - Spaces with LPD  $\leq 0.5$  W/ft<sup>2</sup> are excluded from the 10,000 ft<sup>2</sup> threshold





# 130.1(f) Control Interactions

1. For general lighting, the **manual area control** shall permit the level or amount of light provided while the lighting is on to be set or adjusted by the controls specified in Section 130.1(b), (c), (d), and (e).
2. The manual **area control** shall permit the **shut-off control** to turn the lighting down or off.
3. The **multilevel lighting control** shall permit the automatic **daylighting control** to adjust the electric lighting level in response to changes in the amount of daylight in the daylit zone.
4. The **multilevel lighting control** shall permit the **demand responsive control** to adjust the lighting during a demand response event and to return it to the level set by the multilevel control after the event.
5. The **shut-off control** shall permit the manual area control to turn the lighting on. If the on request occurs while an **automatic time switch control** would turn the lighting off, then the on request shall be treated as an override request consistent with Section 130.1(c)3.
6. The automatic **daylighting control** shall permit the **multilevel lighting control** to adjust the level of lighting.
7. For lighting controlled by **multilevel lighting controls** and by **occupant sensing controls** that provide an automatic-on function, the controls shall provide a partial-on function that is capable of automatically activating between 50-70 percent of controlled lighting power.



# 130.4 Acceptance Testing

- **Acceptance testing required for:**
  - Automatic shut-OFF
  - Automatic daylighting
  - Demand responsive
  - Institutional tuning
- Must use certified ATTs from an approved Acceptance Test Technician Certification Provider (ATTCP)
- More information available at the CEC [Acceptance Test Technician Certification Provider Program](#) webpage





# **Nonresidential Indoor Lighting Prescriptive Measures**



# 140.6(a)2 Power Adjustment Factors (PAF)

- Additional lighting power for installing controls or features beyond mandatory requirements
- See TABLE 140.6-A

TABLE 140.6-A LIGHTING POWER ADJUSTMENT FACTORS (PAF)

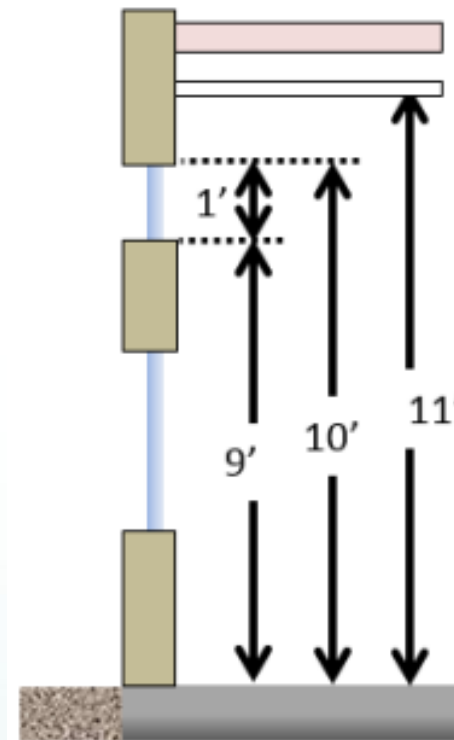
TYPE OF CONTROL	TYPE OF AREA	FACTOR	
a. To qualify for any of the Power Adjustment Factors in this table, the installation shall comply with the applicable requirements in Section 140.6(a)2 b. Only one PAF may be used for each qualifying luminaire unless combined below. c. Lighting controls that are required for compliance with Part 6 shall not be eligible for a PAF			
1. Daylight Dimming plus OFF Control	Luminaires in skylit daylit zone or primary sidelit daylit zone	0.10	
2. Occupant Sensing Controls in Large Open Plan Offices	In open plan offices > 250 square feet: One sensor controlling an area that is:	No larger than 125 square feet	0.40
		From 126 to 250 square feet	0.30
		From 251 to 500 square feet	0.20
3. Institutional Tuning	Luminaires in non-daylit areas. Luminaires that qualify for other PAFs in this table may also qualify for this tuning PAF.	0.10	
	Luminaires in daylit areas. Luminaires that qualify for other PAFs in this table may also qualify for this tuning PAF.	0.05	
4. Demand Responsive Control	All building types of 10,000 square feet or smaller. Luminaires that qualify for other PAFs in this table may also qualify for this demand responsive control PAF	0.05	
5. Clerestory Fenestration	Luminaires in daylit areas adjacent to the clerestory. Luminaires that qualify for daylight dimming plus OFF control may also qualify for this PAF.	0.05	
6. Horizontal Slats	Luminaires in daylit areas adjacent to vertical fenestration with interior or exterior horizontal slats. Luminaires that qualify for daylight dimming plus OFF control may also qualify for this PAF.	0.05	
7. Light Shelves	Luminaires in daylit areas adjacent to clerestory fenestration with interior or exterior light shelves. This PAF may be combined with the PAF for clerestory fenestration. Luminaires that qualify for daylight dimming plus OFF control may also qualify for this PAF	0.10	



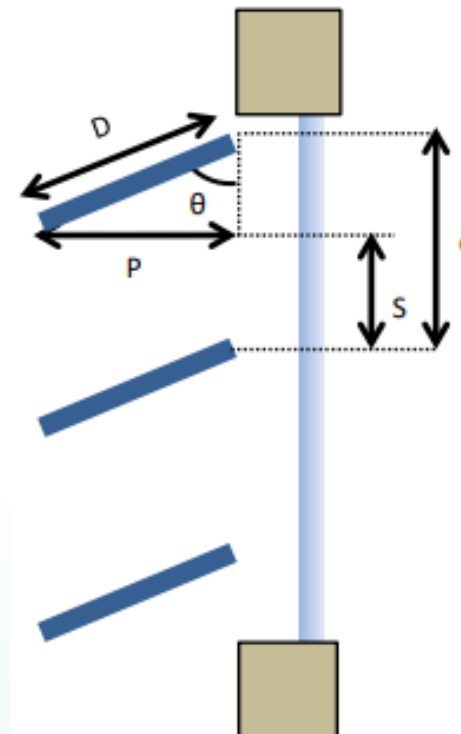


# 140.6(a)2 Power Adjustment Factors cont.

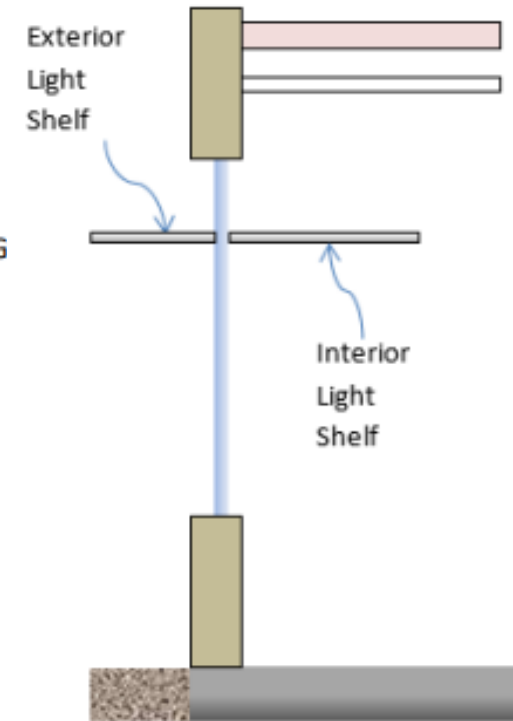
- PAF for increasing daylight potential
  - Clearstory fenestration – 5%
  - Horizontal slats – 5%
  - Interior and exterior light shelves – 10%
- PAF for qualifying small aperture tunable-white and dim-to-warm LED luminaires



Clerestory



Horizontal slats



Light shelves



# 140.6(c) Calculation of Allowed Lighting Power Allowance

- Three methods to calculate lighting power allowance:
  - Complete Building
  - Area Category
  - Tailored
- Lighting power density (LPD,  $W/ft^2$ ) are assigned to buildings or space types





# 140.6(c) Calculation of Allowed Lighting Power Allowance cont.

- **Complete Building Method**

- TABLE 140.6-B lists building types and corresponding LPD
- Single LPD for entire building or tenant space
- Building or tenant space must be at least 90 percent one use type

TABLE 140.6-B COMPLETE BUILDING METHOD LIGHTING POWER DENSITY VALUES

TYPE OF BUILDING	ALLOWED LIGHTING POWER DENSITY (WATTS PER SQUARE FOOT)
Assembly Building	0.70
Financial Institution Building	0.65
Industrial/Manufacturing Facility Building	0.60
Grocery Store Building	0.95
Gymnasium Building	0.65
Library Building	0.70
Healthcare Facility	0.90
Office Building	0.65
Parking Garage Building	0.13
Religious Facility Building	0.70
Restaurant Building	0.70
Retail Store Building	0.90
School Building	0.65
Sports Arena Building	0.75
Motion Picture Theater Building	0.70
Performing Arts Theater Building	0.80
All others buildings	0.40



# 140.6(c) Calculation of Allowed Lighting Power Allowance cont.

- **Area Category Method**

- TABLE 140.6-C lists function areas and corresponding LPD
- Each area calculated separately
- Sum allowed lighting power for all areas combined
- Additional allowance for specific lighting

Based on TABLE 140.6-C Area Category Method

Primary Function Area	2019 Energy Code Allowed Lighting Power Density for General Lighting (W/ft <sup>2</sup> )	LPD Change	
Auditorium Area	0.70	-0.70	
Auto Repair / Maintenance Area	0.55	-0.35	
Audience Seating Area	0.60	New	
Beauty Salon Area	0.80	-0.90	
Civic Meeting Place Area	1.00	-0.30	
Classroom, Lecture, Training, Vocational Area	0.70	-0.50	-42%
Commercial/Industrial Storage	Warehouse	-0.15	-25%
	Shipping & Handling	-	0%
Convention, Conference, Multipurpose and Meeting Area	0.85	-0.35	-29%
Copy Room	0.50	New	-
Corridor Area	0.60	-	0%
Dining Area	Bar/Lounge and Fine Dining	-0.45	-45%
	Cafeteria/Fast Food	-0.60	-60%
	Family and Leisure	-0.50	-50%
Electrical, Mechanical, Telephone Rooms	0.40	-0.15	-27%
Exercise/Fitness Center and Gymnasium Area	0.50	-0.50	-50%
Hotel Function Area	0.85	-0.55	-39%
Museum Area	Exhibition/Display	-1.20	-67%
	Restoration Room	0.75	New

Average 28% reduction in general lighting power allowance





# TABLE 140.6-C

TABLE 140.6-C AREA CATEGORY METHOD - LIGHTING POWER DENSITY VALUES (WATTS/FT<sup>2</sup>)

Primary Function Area		Allowed Lighting Power Density for General Lighting (W/ft <sup>2</sup> )	Additional Lighting Power <sup>1</sup>	
			Qualified Lighting Systems	Additional Allowance (W/ft <sup>2</sup> , unless noted otherwise)
Auditorium Area		0.70	Ornamental	0.30
			Accent, display and feature <sup>3</sup>	0.20
Auto Repair / Maintenance Area		0.55	Detailed Task Work <sup>7</sup>	0.20
Audience Seating Area		0.60	Ornamental	0.30
Beauty Salon Area		0.80	Detailed Task Work <sup>7</sup>	0.20
			Ornamental	0.30
Civic Meeting Place Area		1.00	Ornamental	0.30
Classroom, Lecture, Training, Vocational Area		0.70	White or Chalk Board <sup>1</sup>	4.50 W/ft
Commercial/Industrial Storage	Warehouse	0.45	-	-
	Shipping & Handling	0.60	-	-
Convention, Conference, Multipurpose and Meeting Area		0.85	Ornamental	0.30
Copy Room		0.50	-	-
Corridor Area		0.60	-	-
Dining Area	Bar/Lounge and Fine Dining	0.55	Ornamental	0.30
	Cafeteria/Fast Food	0.40		
	Family and Leisure	0.50		
Electrical, Mechanical, Telephone Rooms		0.40	Detailed Task Work <sup>7</sup>	0.20
Exercise/Fitness Center and Gymnasium Area		0.50	-	-
Hotel Function Area		0.85	Ornamental	0.30
Museum Area	Exhibition/Display	0.60	Accent, display and feature <sup>3</sup>	0.50



# 140.6(c) Calculation of Allowed Lighting Power Allowance cont.

- **Tailored Method:**
  - TABLE 140.6-D lists function areas and target illumination levels
  - Provides general lighting power allowance
  - Also provides additional allowance for specialized lighting if needed:
    - Wall display
    - Floor display
    - Ornamental



Source: Acuity Brands Lighting, Inc.



# TABLE 140.6-D through G

TABLE 140.6-D TAILORED METHOD LIGHTING POWER ALLOWANCES

1	2	3	4
Primary Function Area	General Illumination Level (Lux)	Wall Display Lighting Power Density (W/ft)	Allowed Combined Floor Display Power and Task Lighting Power Density (W/ft <sup>2</sup> )
Auditorium Area	300	3.00	0.20
Convention, Conference, Multipurpose, and Meeting Center Areas	300	2.00	0.35
Dining Areas	200	1.25	0.50
Exhibit, Museum Areas	150	11.50	0.80
Hotel Area:			
Ballroom/Events	400	1.80	0.12
Lobby	200	3.50	0.20
Main entry lobby	200	3.50	0.20
Religious Worship Area	300	1.30	0.40
Retail Sales			
Grocery	600	6.80	0.70
Merchandise Sales, and Showroom Areas	500	11.80	0.80
Theater Area:			
Motion picture	200	2.00	0.20
Performance Arts	200	7.50	0.20

TABLE 140.6-E TAILORED WALL AND FLOOR DISPLAY MOUNTING HEIGHT ADJUSTMENT FACTORS

Height in feet above finished floor and bottom of luminaire(s)	Floor Display or Wall Display Mounting Height Adjustment Factor
< 10'-7"	1.00
10'-7" to 14'-0"	0.85
>14'-0" to 18'-0"	0.75
> 18'-0"	0.70

TABLE 140.6-F ROOM CAVITY RATIO (RCR) EQUATIONS

Determine the Room Cavity Ratio for TABLE 140.6-G using one of the following equations.	
Room cavity ratio for rectangular rooms	$RCR = \frac{5 \times H \times (L + W)}{L \times W}$
Room cavity ratio for irregular-shaped rooms	$RCR = \frac{2.5 \times H \times P}{A}$
Where: L = Length of room; W = Width of room; H = Vertical distance from the work plane to the centerline of the lighting fixture; P = Perimeter of room, and A = Area of room	

TABLE 140.6-G TAILORED METHOD GENERAL LIGHTING POWER ALLOWED – BY ILLUMANCE AND ROOM CAVITY RATIO

General Illuminance Level (lux) <sup>a</sup>	General Lighting Power Density (W/ft <sup>2</sup> ) for the following RCR values <sup>b</sup> values <sup>b</sup>			
	RCR ≤ 2.0	RCR > 2.0 and ≤ 3.5	RCR > 3.5 and ≤ 7.0	RCR > 7.0
150	0.40	0.45	0.60	0.75
200	0.45	0.55	0.75	1.00
300	0.65	0.80	1.00	1.40
400	0.75	0.95	1.25	1.50
500	0.90	1.05	1.45	1.85
600	1.08	1.24	1.64	2.38

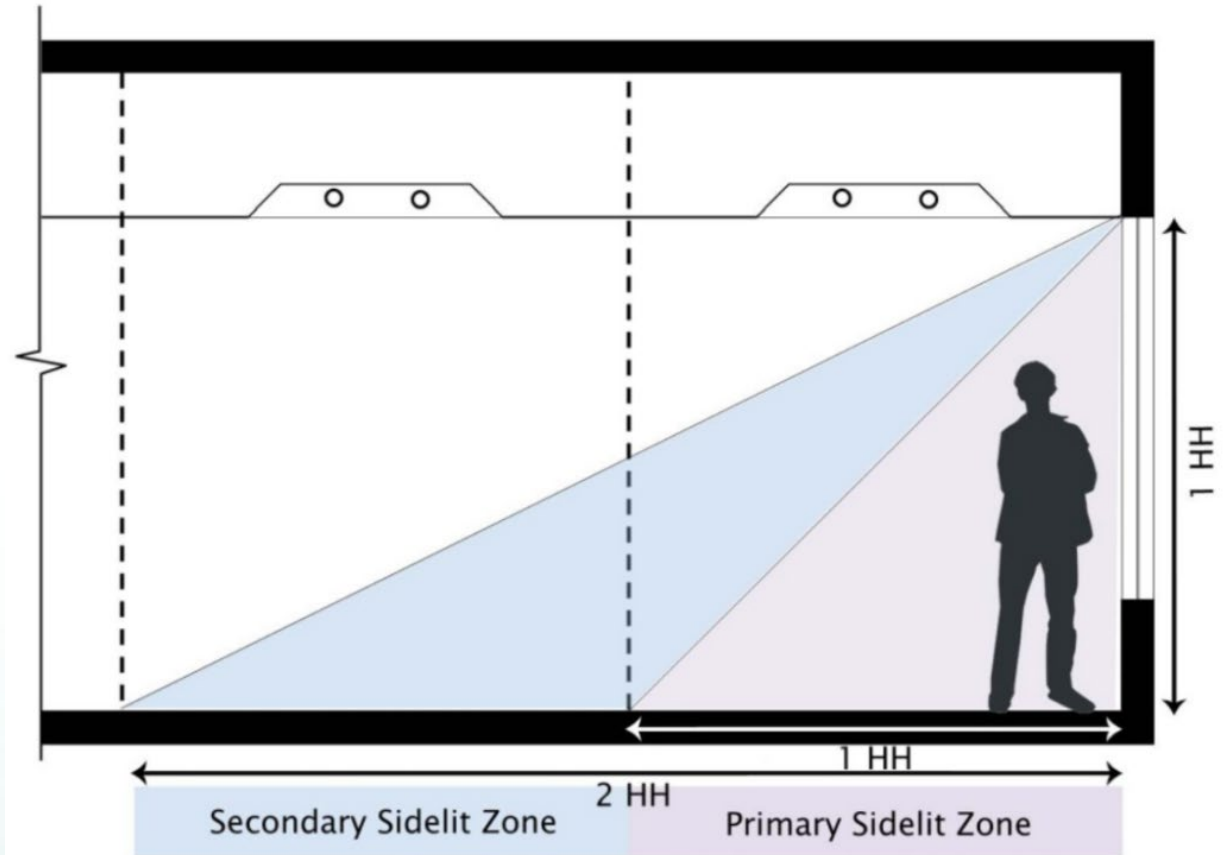
<sup>a</sup> Illuminance values from Column 2 of TABLE 140.6-D.

<sup>b</sup> RCR values are calculated using applicable equations in TABLE 140.6-F.



# 140.6(d) Daylighting Controls in Secondary Daylit Zones

- **Secondary Daylit Zones**
  - Meet §130.1(d)
  - Separately controlled
  - Daylit zones shown on the plans
  - Controlled independently
- **Exceptions:**
  - Rooms with  $< 24 \text{ ft}^2$  glazing, parking garage areas with  $< 36 \text{ ft}^2$  of glazing or opening
  - Secondary daylit zone with  $< 120$  watts of general lighting or  $< 240$  watts in primary and secondary zone
  - Retail sales areas
  - Vertical glazing below overhangs







# **Nonresidential Indoor Lighting Prescriptive Alterations**



# 141.0(b)2I Indoor Lighting Alterations

## 2016 Lighting Alterations

### Entire Luminaire Alterations

- Removing and reinstalling luminaires
- Replacing luminaires ( $\geq 3$  luminaires)
- Adding luminaires
- Adding, removing, replacing walls along with redesign of the lighting system

### Luminaire Component Modification

- Replacing ballast/driver and lamps
- Changing the light source
- Changing the optical system

### Lighting Wiring Alterations

## 2019 Lighting Alterations

### Altered Indoor Lighting Systems

- Include 10% or more of the luminaires serving an enclosed space

### Exceptions

- Spaces with one luminaire
- One-for-one alteration of 50 luminaires per year or less



# 141.0(b)2I Indoor Lighting Alterations cont.

## 2016 Lighting Alterations

### Reduction of existing lighting power

- Offices, hotel/motel, retail – 50% reduction
- All other space types – 35% reduction
- No restrictions on the size of alteration

## 2019 Lighting Alterations

### Reduction of existing lighting power

- All space types – 40% reduction
- One-for-one alterations
- Limited to alterations 5,000 ft<sup>2</sup> or less





# 141.0(b)2I Indoor Lighting Alterations cont.

- Alteration requirements apply if  $\geq 10\%$  of **luminaires** in the space are altered
- Control requirements are dependent on the proposed lighting power
  - Lighting power  $\leq 80\%$  - Area controls and shut-off controls
  - Lighting power  $> 80\%$  - All mandatory controls
  - See TABLE 141.0-F
- **One-for-one luminaire alteration** and building or tenant space  $\leq 5,000 \text{ ft}^2$ 
  - If wattage of altered luminaires is at least 40% lower than existing – area controls and shut-off controls





# 141.0(b)2I Indoor Lighting Alterations cont.

*Based on TABLE 141.0-F Control Requirements for Indoor Lighting System Alterations*

Control Specifications		Lighting power is > 80% to 100% of allowance	Lighting power is ≤ 80% of allowance or; 40% reduction in existing lighting power
Manual Area Controls	130.1(a)	Required*	Required*
Multilevel Controls	130.1(b)	Required	Not Required
Automatic Shut-Off Controls	130.1(c)	Required*	Required*
Daylighting Controls	130.1(d)	Required	Not Required
Demand Responsive Controls	130.1(e)	Required	Not Required

\*130.1(a)3 and 130.1(c)1D only required for new or completely replaced circuits



# 141.0(b)2I Indoor Lighting Alterations Exceptions

- **Exceptions:**

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



# Forms





# Certification of Compliance

- **Certificate of Compliance (NRCC-XXX)**
  - Submitted with permit application, included with plans
  - Used by plans examiner to verify compliance
  - LPA calculations, schedules, lighting controls, PAF, voltage drop, etc.
- **Indoor**
  - NRCC-LTI-E
- **Outdoor**
  - NRCC-LTO-E
- **EPDS, Sign**
  - NRCC-ELC-E, NRCC-LTS-E





# Certification of Installation

- **Certificate of Installation (NRCI-XXX)**
  - Completed by installing contractor
  - Left on-site for building inspector
  - Identifies construction documents that show lighting and controls were installed as proposed in the certificate of compliance
- **Indoor**
  - NRCI-LTI-01 – NRCI-LTI-06
- **Outdoor**
  - NRCI-LTO-01 – NRCI-LTO-02
- **EPDS, Sign**
  - NRCI-ELC-01, NRCI-LTS-01

The image displays four sample forms for the Certificate of Installation, each with a specific title and form number:

- Indoor Lighting (NRCI-LTI-01)**: Includes fields for project name, permit #, building type, phase of construction, and a table for construction documents.
- Outdoor Lighting (NRCI-LTO-01)**: Includes fields for project name, permit #, building type, phase of construction, and a table for construction documents.
- Sign Lighting (NRCI-LTS-01)**: Includes fields for project name, permit #, location of signs, type of construction, and a table for construction documents.
- Electrical Power Distribution (NRCI-ELC-01)**: Includes fields for project name, permit #, building type, phase of construction, and a table for construction documents.

Each form includes a "SCOPE OF RESPONSIBILITY" section and a table for construction documents. The forms are part of the CA Building Energy Efficiency Standards - 2019 Nonresidential Compliance package, dated January 2020.





# Certification of Acceptance

- **Certificate of Acceptance (NRCA-XXX)**
  - Completed by acceptance test technician
  - Left on-site for building inspector, can also be provided electronically
  - Recording of test results and verification of installed controls
  - Form should be from one of the approved providers with logo, CEC forms are watermarked as not for use
- **Indoor**
  - NRCA-LTI-02 - NRCA-LTI-05
- **Outdoor**
  - NRCA-LTO-02





# Nonresidential Indoor Lighting Forms

- Lighting Certificate of Compliance forms combined into one interactive PDF
- Auto populate information from user inputs and conduct simple math
- Form expands and collapses based on selections
- Drop down selections
- Interactive instructions
- Add and delete table rows
- One single signature page

STATE OF CALIFORNIA  
**Indoor Lighting**  
 NRCC-LTI-E (Created 01/20)

CALIFORNIA ENERGY COMMISSION  
 NRCC-LTI-E

CERTIFICATE OF COMPLIANCE  
*This document is used to demonstrate compliance with requirements in §110.9, §110.12(c), §130.0, §130.1, §140.6, and §141.0(b)2 for indoor lighting scopes using the prescriptive path.*

Project Name: California Energy Commission Report Page: Page 1 of 9  
 Project Address: 1516 9th St., Sacramento, CA 95814 Date Prepared: 4/24/2020

**A. GENERAL INFORMATION**

01 Project Location (city)	Sacramento	04 Total Conditioned Floor Area (ft <sup>2</sup> )	10,000
02 Climate Zone	12	05 Total Unconditioned Floor Area (ft <sup>2</sup> )	0
03 Occupancy Types Within Project (select all that apply):		06 # of Stories (Habitable Above Grade)	
<input checked="" type="checkbox"/> Office	<input type="checkbox"/> Retail	<input type="checkbox"/> Warehouse	<input type="checkbox"/> Hotel/Motel
<input type="checkbox"/> Parking Garage	<input type="checkbox"/> High-Rise Residential	<input type="checkbox"/> Relocatable	<input type="checkbox"/> Healthcare
		<input type="checkbox"/> School	<input type="checkbox"/> Support Areas
		Other (write in):	

**B. PROJECT SCOPE**

*Table Instructions: Include any lighting systems that are within the scope of the permit application and are demonstrating compliance using the prescriptive path outlined in §140.6 or §141.0(b)2 for alterations. WARNING: Changing the Calculation Method in this table will result in the deletion of data previously input. If you need to change the calculation method, please open a new form or use "Save As".*

Scope of Work	Conditioned Spaces		Unconditioned Spaces	
01	02	03	04	05
My Project Consists of (check all that apply):	Calculation Method	Area (ft <sup>2</sup> )	Calculation Method	Area (ft <sup>2</sup> )
<input type="checkbox"/> New Lighting System				
	Add Parking Garage-Complete Bldg Method		Remove Parking Garage	
<input checked="" type="checkbox"/> Altered Lighting System	Area Category	10,000		
	Add Altered Lighting System		Remove Last Altered System	
<b>Total Area of Work (ft<sup>2</sup>)</b>	<b>10,000</b>			

**C. COMPLIANCE RESULTS**

*Table Instructions: If any cell on this table says "DOES NOT COMPLY" or "COMPLIES with Exceptional Conditions" refer to Table D. for guidance.*

Lighting in conditioned and unconditioned spaces must not be combined for compliance per §140.6(b)1.	Allowed Lighting Power per §140.6(b) (Watts)					Adjusted Lighting Power per §140.6(a) (Watts)			Compliance Results	
	01	02	03	04	05	06	07	08		
	Complete Building §140.6(c)1	Area Category §140.6(c)2	Area Category Additional §140.6(c)2G (+)	Tailored §140.6(c)3 (+)			Adjustments PAF Control Credits §140.6(a)2 (-)			Total Adjusted (Watts) *Includes Adjustments
(See Table I)	(See Table I)	(See Table I)	(See Table K)	Total Allowed (Watts)	Total Designed (Watts)	(See Table F)	(See Table P)	05 Must be ≥ 08 §140.6		
<b>Conditioned:</b>		6,672.5	0		6,672.5	≥	6,731	=	6,731	<b>DOES NOT COMPLY</b>
<b>Unconditioned:</b>						≥		=		

Table Continued

CA Building Energy Efficiency Standards - 2019 Nonresidential Compliance: <http://www.energy.ca.gov/title24/2019standards> January 2020



# NRCC-LTI-E

STATE OF CALIFORNIA

## Indoor Lighting

NRCC-LTI-E (Created 01/20)

CALIFORNIA ENERGY COMMISSION 

### CERTIFICATE OF COMPLIANCE

NRCC-LTI-E

This document is used to demonstrate compliance with requirements in [§110.9](#), [§110.12\(c\)](#), [§130.0](#), [§130.1](#), [§140.6](#), and [§141.0\(b\)2](#) for indoor lighting scopes using the prescriptive path.

Project Name: California Energy Commission Report Page: Page 1 of 9  
 Project Address: 1516 9th St., Sacramento, CA 95814 Date Prepared: 4/24/2020

### A. GENERAL INFORMATION

01	Project Location (city)	Sacramento	04	Total Conditioned Floor Area (ft <sup>2</sup> )	10,000
02	Climate Zone	12	05	Total Unconditioned Floor Area (ft <sup>2</sup> )	0
03	Occupancy Types Within Project (select all that apply):		06	# of Stories (Habitable Above Grade)	
<input checked="" type="checkbox"/>	Office	<input type="checkbox"/>	Retail	<input type="checkbox"/>	Warehouse
<input type="checkbox"/>	Parking Garage	<input type="checkbox"/>	High-Rise Residential	<input type="checkbox"/>	Relocatable
<input type="checkbox"/>		<input type="checkbox"/>	Hotel/Motel	<input type="checkbox"/>	School
<input type="checkbox"/>		<input type="checkbox"/>	Healthcare	<input type="checkbox"/>	Other (write in):
<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	Support Areas

### B. PROJECT SCOPE

Table Instructions: Include any lighting systems that are within the scope of the permit application and are demonstrating compliance using the prescriptive path outlined in [§140.6](#) or [§141.0\(b\)2](#) for alterations. WARNING: Changing the Calculation Method in this table will result in the deletion of data previously input. If you need to change the calculation method, please open a new form or use "Save As".

Scope of Work	Conditioned Spaces		Unconditioned Spaces	
01	02	03	04	05
My Project Consists of (check all that apply):	Calculation Method	Area (ft <sup>2</sup> )	Calculation Method	Area (ft <sup>2</sup> )
<input type="checkbox"/> New Lighting System				
	Add Parking Garage-Complete Bldg Method		Remove Parking Garage	
<input checked="" type="checkbox"/> Altered Lighting System	Area Category	10,000		
	Add Altered Lighting System		Remove Last Altered System	
<b>Total Area of Work (ft<sup>2</sup>)</b>	<b>10,000</b>			

### C. COMPLIANCE RESULTS

Table Instructions: If any cell on this table says "DOES NOT COMPLY" or "COMPLIES with Exceptional Conditions" refer to Table D. for guidance.

Lighting in conditioned and unconditioned spaces must not be combined for compliance per <a href="#">§140.6(b)1</a> .	Allowed Lighting Power per <a href="#">§140.6(b)</a> (Watts)					=	Total Allowed (Watts)	≥	Adjusted Lighting Power per <a href="#">§140.6(a)</a> (Watts)			=	Total Adjusted (Watts) *Includes Adjustments	Compliance Results
	01	02	03	04	05				06	07	08			
	Complete Building <a href="#">§140.6(c)1</a> (See Table I)	Area Category <a href="#">§140.6(c)2</a> (See Table I)	Area Category Additional <a href="#">§140.6(c)2G</a> (+) (See Table J)	Tailored <a href="#">§140.6(c)3</a> (+) (See Table K)					Total Designed (Watts) (See Table F)	Adjustments PAF Control Credits <a href="#">§140.6(a)2</a> (-) (See Table P)				
<b>Conditioned:</b>		6,672.5	0			<b>6,672.5</b>	≥	6,731				<b>6,731</b>	<b>DOES NOT COMPLY</b>	
<b>Unconditioned:</b>							≥							

Table Continued



# NRCC-LTI-E cont.

STATE OF CALIFORNIA

## Indoor Lighting

NRCC-LTI-E (Created 01/20)



CERTIFICATE OF COMPLIANCE NRCC-LTI-E

Project Name: California Energy Commission Report Page: Page 2 of 9

Project Address: 1516 9th St., Sacramento, CA 95814 Date Prepared: 4/24/2020

Controls Compliance (See Table H for Details)	COMPLIES with Exceptional Conditions
Rated Power Reduction Compliance (See Table Q for Details)	Not Applicable

### D. EXCEPTIONAL CONDITIONS ?

*This table is auto-filled with uneditable comments because of selections made or data entered in tables throughout the form.*

Track Lighting has been included in this project, details are provided in Table G.  
 Table H Indoor Lighting Controls Permit Applicant Notes:  
 Private Office 1: Partial-on required in private office to activate 50 to 70% of lighting automatically. Daylighting control exempt (less than 120 watts of lighting in daylight zone)  
 Private Office 2: Partial-on required in private office to activate 50 to 70% of lighting automatically. Daylighting control exempt (less than 120 watts of lighting in daylight zone)  
 Private Office 3: Partial-on required in private office to activate 50 to 70% of lighting automatically. Daylighting control exempt (less than 120 watts of lighting in daylight zone)  
 Private Office 4: Partial-on required in private office to activate 50 to 70% of lighting automatically. Daylighting control exempt (less than 120 watts of lighting in daylight zone)  
 Lobby: Daylighting controls not required (less than 120 watts of lighting in daylight zone)  
 Restroom: Restrooms exempt from multi-level controls

### E. ADDITIONAL REMARKS ?

*This table includes remarks made by the permit applicant to the Authority Having Jurisdiction.*

### F. INDOOR LIGHTING FIXTURE SCHEDULE ?


*Table Instructions: Include all permanent designed lighting and all portable lighting in offices.*

Designed Wattage: Conditioned Spaces										
01	02	03	04	05	06	07	08	09	10	
Name or Item Tag	Complete Luminaire Description	Modular (Track) Fixture	Small Aperture & Color Change <sup>1</sup>	Watts per luminaire <sup>2</sup>	How Wattage is determined	Total number luminaires	Exempt per §140.6(a)3	Design Watts	Field Inspector	
									Pass	Fail
LT1	2' x 4' LED Troffer	<input type="checkbox"/>	<input type="checkbox"/>	42	Mfr. Spec <sup>2</sup>	142	<input type="checkbox"/>	5,964	<input type="checkbox"/>	<input type="checkbox"/>
LT2	LED Sconce	<input type="checkbox"/>	<input type="checkbox"/>	8	Mfr. Spec <sup>2</sup>	50	<input type="checkbox"/>	400	<input type="checkbox"/>	<input type="checkbox"/>
LT3	LED Chalkboard	<input type="checkbox"/>	<input type="checkbox"/>	35	Mfr. Spec <sup>2</sup>	4	<input type="checkbox"/>	140	<input type="checkbox"/>	<input type="checkbox"/>
LT4	LED Track	<input checked="" type="checkbox"/>	<input type="checkbox"/>	200	See Table G	1	<input type="checkbox"/>	200	<input type="checkbox"/>	<input type="checkbox"/>



# NRCC-LTI-E cont.

STATE OF CALIFORNIA  
**Indoor Lighting**  
 NRCC-LTI-E (Created 01/20)

CALIFORNIA ENERGY COMMISSION 

CERTIFICATE OF COMPLIANCE		NRCC-LTI-E	
Project Name: California Energy Commission	Report Page:	Page 4 of 9	
Project Address: 1516 9th St., Sacramento, CA 95814	Date Prepared:	4/24/2020	

Not Required ≤ 10,000 SF		Whole Building Timeswitch		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
Area Level Controls										
04	05	06	07	08	09	10	11	12		
Area Description	Complete Building or Area Category Primary Function Area	Area Controls §130.1(a)	Multi-Level Controls §130.1(b)	Shut-Off Controls §130.1(c)	Primary/Skylit Daylighting §130.1(d)	Secondary Daylighting §140.6(d)	Interlocked Systems §140.6(a)1	Field Inspector		
								Pass	Fail	
Open Office Area	Office (> 250 square feet)	Manual ON/OFF	Dimmer	See Bldg Lvl	Included	Included	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Private Office 1	Office (≤ 250 square feet)	Manual ON/OFF	Dimmer	Partial On*	Exempt*	Exempt*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Private Office 2	Office (≤ 250 square feet)	Manual ON/OFF	Dimmer	Partial On*	Exempt*	Exempt*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Private Office 3	Office (≤ 250 square feet)	Manual ON/OFF	Dimmer	Partial On*	Exempt*	Exempt*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Private Office 4	Office (≤ 250 square feet)	Manual ON/OFF	Dimmer	Partial On*	Exempt*	Exempt*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Conference Room	Convention, Conference, Multipurpose, and Meeting Center	Manual ON/OFF	Dimmer	Vacancy	Included	Included	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Lobby	Main Entry Lobby	Manual ON/OFF	Dimmer	See Bldg Lvl	Exempt*	Exempt*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Restroom	Restroom	Auth. Personel	Exempt*	Occ. Sensor	NA	NA	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Classroom	Classroom, Lecture, Training, Vocational	Manual ON/OFF	Dimmer	Vacancy	Included	Included	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
*NOTES: Controls with a * require a note in the space below explaining how compliance is achieved. EX: Conference 1: Primary/Skylight Daylighting: Exempt because less than 120 watts of general lighting; EXCEPTION 1 to §130.1(d)2						13				
						Plan Sheet Showing Daylit Zones:				
						EL3				
Private Office 1	Partial-on required in private office to activate 50 to 70% of lighting automatically. Daylighting control exempt (less than 120 watts of lighting in daylight zone)									
Private Office 2	Partial-on required in private office to activate 50 to 70% of lighting automatically. Daylighting control exempt (less than 120 watts of lighting in daylight zone)									
Private Office 3	Partial-on required in private office to activate 50 to 70% of lighting automatically. Daylighting control exempt (less than 120 watts of lighting in daylight zone)									





# Nonresidential Indoor Lighting for the Plans Examiner

- Verify plans with NRCC-LTI-E form
  - Verify controls are specified
    - Area
    - Multilevel
    - Shut-off
    - Automatic Daylighting
    - Demand Responsive
  - Verify lighting power and allowances
    - Lighting schedule
    - General lighting power
    - Specific application allowances
    - Power adjustment factors
  - Verify applicable acceptance & installation forms are specified

STATE OF CALIFORNIA  
**Indoor Lighting**  
NRCC-LTI-E (Created 01/20)

CALIFORNIA ENERGY COMMISSION  
NRCC-LTI-E

This document is used to demonstrate compliance with requirements in §110.9, §110.12(c), §130.0, §130.1, §140.6, and §141.0(b)2 for indoor lighting scopes using the prescriptive path.

Project Name: California Energy Commission Report Page: Page 1 of 9  
Project Address: 1516 9th St., Sacramento, CA 95814 Date Prepared: 4/24/2020

**A. GENERAL INFORMATION**

01 Project Location (city)	Sacramento	04 Total Conditioned Floor Area (ft <sup>2</sup> )	10,000		
02 Climate Zone	12	05 Total Unconditioned Floor Area (ft <sup>2</sup> )	0		
03 Occupancy Types Within Project (select all that apply):		06 # of Stories (Habitable Above Grade)			
<input checked="" type="checkbox"/> Office	<input type="checkbox"/> Retail	<input type="checkbox"/> Warehouse	<input type="checkbox"/> Hotel/Motel	<input type="checkbox"/> School	<input type="checkbox"/> Support Areas
<input type="checkbox"/> Parking Garage	<input type="checkbox"/> High-Rise Residential	<input type="checkbox"/> Relocatable	<input type="checkbox"/> Healthcare	<input type="checkbox"/> Other (write in):	

**B. PROJECT SCOPE**

Table Instructions: Include any lighting systems that are within the scope of the permit application and are demonstrating compliance using the prescriptive path outlined in §140.6 or §141.0(b)2 for alterations. WARNING: Changing the Calculation Method in this table will result in the deletion of data previously input. If you need to change the calculation method, please open a new form or use "Save As".

Scope of Work	Conditioned Spaces			Unconditioned Spaces	
01	02	03	04	05	
My Project					
<input type="checkbox"/> New Lighting System					
<input checked="" type="checkbox"/> Altered Lighting System					

**C. COMPLIANCE RESULT**

Table Instructions: If any

Lighting in conditioned and unconditioned spaces must not be combined for compliance per §140.6(b)1.	Com Build \$140
Conditioned:	
Unconditioned:	

Table Continued

CA Building Energy Efficiency



# Nonresidential Indoor Lighting for the Building Inspector

- Verify installation matches plans and NRCC-LTI-E
  - Use NRCC-LTI-E as an inspection checklist
- Verify installed controls
  - Area
  - Multilevel
  - Shut-off
  - Automatic daylighting
  - Demand responsive
- Verify completed NRCI forms
- Verify completed NRCA forms
  - Must be signed by a certified technician





# Resources





# Approved Compliance Software

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## Residential

- CBECC-Res
- EnergyPro
- Right-Energy Title 24

## Nonresidential

- CBECC-Com
- EnergyPro

- More information and up to date [list of approved software](#)



# Approved ATTCPs

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- **Lighting ATTCPs approved for 2019 Energy Code**
  - CALCTP – California Advanced Lighting Controls Training Program
  - NLCAA – National Lighting Contractors Association of America
  
- More information available at the CEC [Acceptance Test Technician Certification Provider Program](#) webpage





# Blueprint Newsletter

- Published quarterly
- Clarifies frequently asked questions on all topics related to the Energy Code
- Highlights new resources, clarifications, and more on the Energy Code
- Sign up for our list server and receive Blueprint Newsletter email quarterly
- More information about the [Blueprint Newsletter](#)

Issue 126 April - June 2019

## BLUEPRINT

CALIFORNIA ENERGY COMMISSION  
EFFICIENCY DIVISION

### IN THIS ISSUE

- 2019 Energy Code: Low-rise Residential Summary of Major Changes
- 2019 Energy Code: Nonresidential, Hotel and Motel, High-rise Residential Summary of Major Changes
- 2019 Energy Code: CBECC Software and ACM Manuals Approved
- 2016 Energy Code: New Fact Sheets and Videos for Covered Processes
- Q&A
  - Outdoor Electric Heating
  - Flag Pole Lighting
  - Continuous Insulation and Z-Clips
- Energy Code Ace Class Schedule
- Energy Code Ace 2019 Reference Ace

### 2019 ENERGY CODE: LOW-RISE RESIDENTIAL SUMMARY OF MAJOR CHANGES

The most significant change in the 2019 Building Energy Efficiency Standards (Energy Code) for low-rise residential buildings is the introduction of photovoltaic (PV) requirements in the prescriptive standards. There are also significant changes related to the indoor air quality requirements. This is a summary of these and other major changes:

#### Mandatory Measures

1. Walls with 2x6 framing require R-20 minimum insulation for wood-framed; or 0.071 maximum U-factor. **§ 150.0(c)2**
2. Modifications to the indoor air quality requirements of American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 62.2 are included for various building and dwelling unit configurations such as horizontally attached buildings, or central ventilation systems. Balanced or continuously operating supply or exhaust ventilation system required. Home Energy Rating System (HERS) verification required when kitchen range hoods are installed. **§ 150.0(o)**
3. Minimum efficiency reporting value (MERV) 13 air filters (or equivalent) are required for heating, cooling, and on the supply side of ventilation systems. **§ 150.0(m)12**
4. Fan efficacy requirements are 0.45 watts/cubic feet per minute (CFM) or less for gas furnace air-handling units; or 0.58 watts/CFM or less for air-handling units that are not gas furnaces. New fan efficacy requirement for small-duct high-velocity forced-air systems. **§ 150.0(m)13B, C, D**

#### Prescriptive Compliance

1. New PV solar electric generation requirement. **§ 150.1(c)14**
2. New prescriptive **Table 150.1-B** for multifamily buildings. **§ 150.1(c)**
3. Wall U-factors in climate zones 1-5 and 8-16 reduced to 0.048 maximum in single-family buildings; climate zones 6-7 remain at 0.065 maximum. **§ 150.1(c)1B**
4. New exterior door U-factor 0.20 maximum and National Fenestration Rating Council (NFRC) labeling requirements. **§ 150.1(c)5, § 110.6(a)5**
5. Quality insulation installation (QII) for all single-family buildings in all climate zones, and multifamily buildings in all climate zones except climate zone 7. HERS verification required. **§ 150.1(c)1E**
6. New prescriptive options for heat pump water heaters for newly constructed buildings, additions, and alterations. **§ 150.1(c)8, § 150.2(a)1D, § 150.2(b)1H**

1



# Online Resource Center

## Online Resource Center

The Online Resource Center provides educational assistance about the Building Energy Efficiency Standards to building and enforcement communities. The California Energy Commission and utilities developed the resources, which include fact sheets, energy videos, and presentations.

Expand All

- Compliance Forms
+
- Energy Videos
+
- Trainings and Upcoming Events
+
- Exhibitor Booth Handouts
+

**ENERGY STANDARDS AND FORMS**

**BUILDING ENERGY EFFICIENCY STANDARDS - TITLE 24**

- 2022 Building Energy Efficiency Standards
- 2019 Building Energy Efficiency Standards
- 2016 Building Energy Efficiency Standards
- Online Resource Center**
- Past Building Energy Efficiency Standards

**CONTACT**

[Building Energy Efficiency Standards - Title 24](#)


Toll-free in California: 800-772-3300  
Outside California: 916-654-5106

**SUBSCRIBE**

Building Energy Efficiency Standards


First Name \*

**RESOURCES AND TRAINING MATERIALS**




**Overview**

Look for informational resources that cover multiple building components in a single document for residential and nonresidential buildings.




**Commissioning**

Mandatory commissioning requirements for nonresidential buildings.




**Covered Processes**


Mandatory and prescriptive covered processes requirements for nonresidential buildings.



**Electrical Power Distribution**

Mandatory electrical power distribution requirements for nonresidential buildings.





Online Resource Center webpage



# Energy Code Ace

The screenshot shows the Energy Code Ace website homepage. At the top, there is a navigation bar with the Energy Code Ace logo and the tagline "Helping you play your cards right". The navigation bar includes links for "About" and "Contact", and dropdown menus for "Tools Ace", "Training Ace", and "Resources Ace", along with a search bar. The main content area features a headline: "Don't gamble on Title 24, Part 6 and Title 20 compliance. Ace it with:". Below this, there are three cards: "Ace Tools™" (blue), "Ace Training™" (green), and "Ace Resources™" (red). Each card contains a brief description of the service and an "Ace it" button. The cards are decorated with playing card symbols (spade, club, and heart) in the corners.

- Forms & Resource tools
- Free training (in person and online)
- Checklists, Trigger Sheets for building departments
- [Energy Code Ace](#) webpage



# Hotline

---

- Open Monday through Friday
  - 8:00 a.m. to noon
  - 1:00 p.m. to 4:30 p.m.
- Call at:
  - 1-800-772-3300 (In CA, toll free)
  - 1-916-654-5106 (Outside CA)
- Email at: [Title24@energy.ca.gov](mailto:Title24@energy.ca.gov)



# E-mail Lists

- Main conduit for communicating with stakeholders
- Sign up on [CEC listserver](#) webpage
- Subscribe to the following Efficiency Lists:
  - Building Standards
  - Blueprint
- Respond to confirmation email within 24 hours

A screenshot of the California Energy Commission's website, specifically the "Energy Commission's Mailing List Servers" page. The page features a blue header with the CEC logo and navigation links. The main content area has a white background with a blue title: "List Servers (Automated Email Groups) Hosted by the California Energy Commission". Below the title, there is a paragraph explaining the purpose of the list servers. A section titled "Subscribe or Unsubscribe" provides instructions for users, including a list of steps: "Enter your first and last name, email address (please make sure you type your email address correctly)", "Select the Subscribe/Unsubscribe radio button", "Check the Boxes next to list(s) you wish to/wish not to, receive announcements from.", and "Click on the 'Submit' button to complete the process". A note states, "You will receive an email asking to confirm your subscription." and another note says, "You can 'Unsubscribe from All' via the button below." At the bottom, there is a bolded instruction: "Unsubscribe From All by Closing/Changing Email Address".





**Thank You!**

