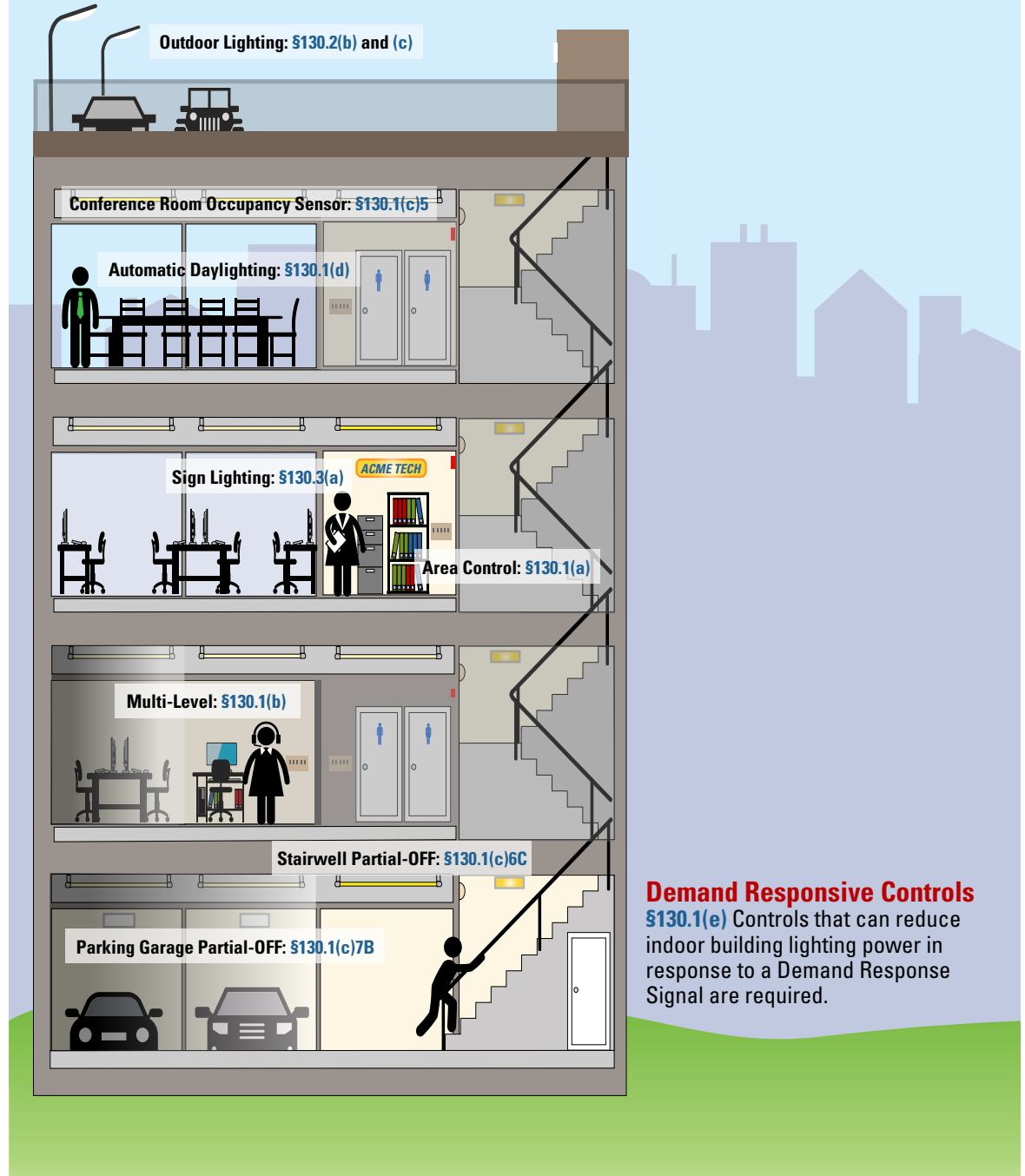


Outdoor Lighting Controls

§130.2(b) Requires luminaire cutoff that reduces backlight, uplight and glare (BUG) in alignment with Title 24, Part 11.

§130.2(c) Includes controls that automatically turn off lighting power when daylight is available, automatic reduction of lighting power for scheduled unoccupied times and motion sensors that reduce lighting levels when no one is present.

§130.3(a)2 Requires outdoor illuminated signs to be controlled with photocontrol and automatic time-switch, or astronomical time-switch control.



What Are Mandatory Lighting Controls?

The 2019 Title 24, Part 6 Building Energy Efficiency Standards (Energy Code) regulate the installation of lighting controls in order to reduce the use of unnecessary lighting, thus reducing energy consumption. Automatic lighting controls regulate the lighting power and illumination levels of connected lighting, in each space, without depending on an occupant to control the lights. Manual controls allow the occupant to override the automatic lighting controls when desired. Project scope and compliance pathway will determine which Mandatory controls will be required (i.e., new construction does not have exceptions to any controls, whereas lighting alteration projects have exceptions when using the Wattage Reduction Method).

Why?

Energy savings can be achieved from the reduced use of artificial lighting by installing controls to dim/switch electric lights automatically while still allowing users to decide if they prefer lighting on or off.

Acceptance Testing Section 130.4

A certified acceptance test technician (ATT) is required to test applicable installed controls before the final occupancy permit is provided. ATTs are not required to be third-party inspectors and can be the installing contractor certified via a California Energy Commission approved [Acceptance Test Technician Certification Provider \(ATTCP\)](#).

- Exception: [Section §141.0\(b\)](#): In an alteration in which any number of controls are being added to ≤20 luminaires for the entire permitted project (indoor, outdoor and sign lighting), acceptance testing is not required.

Relevant Code Sections

- [Section 110.9](#) – Mandatory Requirements for Lighting Controls and Systems, Ballasts, and Luminaires
- [Section 110.12](#) – Mandatory Requirements for Demand Management
- [Section 130.0\(d\)](#) – Lighting Systems and Equipment and Electrical Power Distribution Systems, Lighting Controls
- [Section 130.1](#) – Mandatory Indoor Lighting Controls
- [Section 130.2](#) – Outdoor Lighting Controls and Equipment
- [Section 130.3](#) – Sign Lighting Controls
- [Section 130.4](#) – Lighting Control Acceptance and Installation Certificate Requirements
- [Section 141.0\(a\)](#) – Addition of Indoor/Outdoor/Sign Lighting System(s) to Existing Buildings/Systems
- [Section 141.0\(b\)2](#) – Altered Indoor/Outdoor/Sign Lighting System(s) to Existing Buildings/Systems
- [Nonresidential Reference Appendix NA7 \(NA7.6 - NA7.9\)](#) – Installation and Acceptance Requirements for Nonresidential Buildings and Covered Processes
- [Nonresidential Reference Appendix NA8](#) – Library of Default Luminaire Power

Relevant Compliance Forms

Certificate of Compliance

- [NRCC-LTI-E](#): Prescriptive Indoor Lighting
- [NRCC-LTO-E](#): Prescriptive Outdoor Lighting
- [NRCC-LTS-E](#): Prescriptive Sign Lighting
- [NRCC-PRF-01-E](#): Performance – Lighting in Conditioned Spaces Used to Show Compliance

Certificate of Installation

- [NRCI-LTI-01-E](#): Indoor Lighting – All
- [NRCI-LTI-02-E](#): Indoor Lighting – Energy Management Control System (EMCS) or Lighting Control System
- [NRCI-LTI-04-E](#): Indoor Lighting – Two Interlocked Lighting Systems
- [NRCI-LTI-05-E](#): Indoor Lighting – Power Adjustment Factors (PAF)
- [NRCI-LTI-06-E](#): Indoor Lighting – Additional Video Conference Studio Lighting
- [NRCI-LTO-01-E](#): Outdoor Lighting
- [NRCI-LTO-02-E](#): Energy Management Control System (EMCS) or Lighting Control System
- [NRCI-LTS-01-E](#): Sign Lighting



Trying to find an ATT?

Look for ATTs in your area through the ATTCP provider websites located at:

www.energy.ca.gov/title24/attcp/providers.html

Relevant Compliance Forms (continued)

Certificate of Acceptance

- [NRCA-LTI-02-A](#): Indoor Lighting – Automatic Shut-Off Control
- [NRCA-LTI-03-A](#): Indoor Lighting – Automatic Daylighting Control
- [NRCA-LTI-04-A](#): Indoor Lighting – Demand Responsive Control
- [NRCA-LTI-05-A](#): Indoor Lighting - Institutional Tuning PAF
- [NRCA-LTO-02-A](#): Outdoor Lighting Control

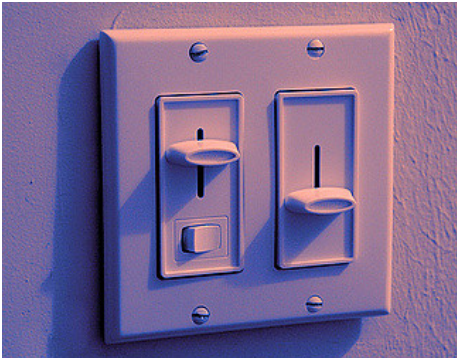
Which NRCI and NRCA forms are required is based on controls installed and will vary by project. Once filled out, the NRCC forms for the project will populate a table indicating required NRCI and NRCA forms.

Compliance Requirements

All lighting controls must comply with the applicable requirements in [Section 110.9](#) and must be installed in accordance with the manufacturer's instructions ([Section 130.0\(d\)](#)). [Section 130.1](#) covers indoor lighting controls. [Section 130.2](#) describes requirements for outdoor lighting controls. [Section 130.3](#) pertains to illuminated sign lighting controls. Table 1 outlines the lighting control requirements of [Section 110.9\(b\)](#) and control interactions, per [Section 130.1\(f\)](#).

		Lighting Control Requirements §110.9(b)	Control Interactions §130.1(f)
Lighting Controls	Manual Area		<ol style="list-style-type: none"> When general lighting is on, all other Mandatory controls (§130.1(b)(c)(d)(e)) must be allowed to set or adjust lighting power. Must allow shut-off controls (§130.1(c)) to turn lighting power down or OFF.
	Time-Switch	<ol style="list-style-type: none"> Must have backup capabilities to prevent loss of device's schedule if power is interrupted for a specific timer period. <ol style="list-style-type: none"> Allow 2-hour manual override and allow for a 24-hour holiday shut-off period. 	
		<ol style="list-style-type: none"> Predict sunrise/sunset, retain timekeeping accuracy, display pertinent information, adjust for daylight savings and have independent offsets for each channel within 90 minutes of sunrise and sunset. 	
		<ol style="list-style-type: none"> Include at least 2 separate programmable sets per zone. 	<ol style="list-style-type: none"> Must allow daylighting controls (§130.1(d)) to adjust lighting power. Must allow demand responsive controls (§130.1(e)) to adjust lighting power.
		<ol style="list-style-type: none"> Include setback that allows each channel to be switched and/or dimmed to lower lighting levels and programmable to at least one specific time of day. 	
	Shut-OFF		<ol style="list-style-type: none"> Must allow the manual area control (§130.1(a)) on and allow override request per §130.1(c)3.
	Daylighting	<ol style="list-style-type: none"> Must have calibration mode that automatically returns to most recent time delay setting and a set point control that easily distinguishes settings within 10% of full-scale adjustments; 5% linear response accuracy as measured by light sensor; and capable of remote calibration to avoid affecting accuracy. 	<ol style="list-style-type: none"> Must allow the multi-level controls (§130.1(b)) to adjust lighting power.
	Dimmer	<ol style="list-style-type: none"> Must reduce power by 65% and provide reduced flicker operation. Zero lumen output when OFF and when wall box dimmers are used in 3-way circuits, can turn ON to level set by dimmer after being turned OFF. 	
	Occupancy Sensing including occupant, motion, vacancy, Partial-ON and Partial-OFF Sensors	<ol style="list-style-type: none"> Must automatically shut off, or reduce lighting, within 20 minutes when area vacant, with a grace period of 15 - 30 seconds to turn light on when sensor has timed out, and provide visible status signal indicating proper, failed or malfunctioning control. Sensor cannot have features that allow disabling unless via changing settings. Ultrasonic and microwave radiation sensors have additional requirements. 	<ol style="list-style-type: none"> Must provide partial-ON function activating 50-70% of lighting power, when multi-level (§130.1(b)) and automatic-on function (§130.1(c)) required.
	Part-night Outdoor	<ol style="list-style-type: none"> Uses both light sensing and time measurement with sunrise/sunset accuracy within +/- 15 minutes, able to both reduce and turn OFF lighting power as programmed by the user at any time. 	

Table 1: Lighting Control Requirements – [Section 110.9\(b\)](#) & Control Interactions – [Section 130.1\(f\)](#)



Check out the [Energy Code Ace Trigger Sheet](#) on Nonresidential Interior Lighting Alterations for more information on how the Mandatory control requirements apply to alteration lighting projects.

Mandatory Indoor Lighting Controls Section 130.1

- **Manual Area Controls Section 130.1(a)** - Manual controls that allow the lighting in each area to be manually turned on and off are required.
 - Exception: Designed egress lighting up to 0.2 W/ft² with controls not accessible to unauthorized personnel
- Each enclosed space must be controlled with a switch that is readily accessible to the occupant
 - Exception: Public restrooms having two or more stalls, parking areas, stairwells and corridors may use a manual control not accessible to unauthorized personnel
- The control must be located in the same enclosed space with the lighting it controls
 - Exception: For malls and atria, auditorium areas, retail merchandise sales areas, wholesale showroom areas, commercial and industrial storage areas, general commercial and industrial work areas, convention centers, and arenas, the manual area control may be located so that a person using the control can see the lights or area controlled by it, or so that it can visually signal or display the current state of the controlled lighting (i.e., the control is annunciated).
- The manual area control must provide separate control of general, display (floor, wall, window and case), ornamental and special effects lighting so that each lighting type can be turned on/off separately
- **Multi-Level Controls Section 130.1(b)** - General lighting in enclosed spaces ≥ 100 ft² and exceeding 0.5 W/ft², must have multi-level controls enabling occupants to control the amount of light in the space. The number of control steps depends on the type of light source and must meet the uniformity requirements in [Table 130.1-A](#).
 - Exception: Restrooms and areas enclosed by ceiling height partitions with only one luminaire with no more than two lamps

Healthcare Facilities

Now subject to the requirements of the Energy Code, Healthcare Facilities have many exceptions to these Mandatory lighting control requirements. For more information on this occupancy type, see the [Energy Code Ace Fact Sheet](#) on Healthcare Facilities and view the recording of [Decoding 2019 Title 24, Part 6: Let's Talk Healthcare Facilities](#).



- **Shut-OFF Controls Section 130.1(c)** - Controls able to automatically reduce or shut off lighting power when the space is typically unoccupied are required
 - Exception: Egress lighting designed to meet minimum light required by CBC §1008 in partial-off mode
- **Section 130.1(c)1**: Using either an automatic time-switch control (typically controls the entire building) or occupancy sensors in every room, so that all installed lighting automatically will shut OFF when building or space is unoccupied
 - Exceptions:
 - 24 hour/7 day a week space, and/or entire building
 - Occupancy sensor shut-OFF controls installed per Section 130.1(c)5 or 130.1(c)7 will satisfy the automatic shut-OFF requirements and additional shut OFF controls will not be required
 - Designed egress lighting up to 0.1 W/ft²
 - Electrical equipment rooms
 - Emergency lighting connected to battery/emergency power supply and is OFF when normal power available
 - Separate controls are required for:
 - General lighting versus display (including display case) and ornamental lighting
 - Each floor (other than stairwells)
 - Each enclosed space not exceeding 5,000 ft²
 - Exception: In malls, auditoriums, single-tenant retail, industrial, convention centers and arena functional areas, the area controlled can be ≤20,000 ft²
- **Section 130.1(c)2**: Countdown timer switches may be used for single-stall bathrooms and closets <70 ft² (max. setting 10 min.), and server rooms <500 ft² (max. setting 30 min.)

For more on shut-OFF control requirements with automatic time-switch, with occupancy sensor and specific to space type, see Table 2, below.


When Using Automatic Time-Switch for Shut-OFF Controls (Typically Serving an Entire Building)	When Using Occupancy Sensors for Shut-OFF Controls (Serving Each Room)
<p>Manual-ON mode may be included as a feature.</p> <p>§130.1(c)3: Occupants staying after hours must be able to activate lighting as needed using Manual Area Control with a temporary override (max. 2 hours).</p> <ul style="list-style-type: none"> • Exception: Override time may exceed 2 hours for malls, auditoriums, single tenant retail, industrial spaces and arenas where captive-key override is used <p>§130.1(c)4: An automatic holiday shut-OFF feature that allows all lighting to be turned off for at least 24 hours, and then will automatically resume programmed shut-OFF schedule is required.</p> <ul style="list-style-type: none"> • Exception: Retail stores and associated malls, restaurants, grocery stores, churches and theaters 	<p>Not Required</p> 
Shut-OFF Controls Specific to Space Type	
<p>§130.1(c)5: Occupancy sensors must be used to shut off 100% of the lighting when an office ≤250 ft², multipurpose rooms <1,000 ft², classrooms, bathrooms and conference rooms of any size are unoccupied. The type of occupancy sensor depends on if the space triggers multi-level controls per §130.1(b):</p> <ul style="list-style-type: none"> • Spaces ≥100 ft² or using >0.5 W/ft² can use either a partial-ON or vacancy occupancy sensor • Spaces <100 ft² or using ≤0.5 W/ft² can use any occupancy sensor type 	
<p>§130.1(c)6: Aisle ways and open areas in warehouses, library book stack aisles and corridors, and stairwell spaces must provide partial-OFF occupancy sensors that reduce the lighting power by at least 50% when unoccupied and additionally shut off all lighting at the end of the workday per §130.1(c).</p> <ul style="list-style-type: none"> • Exception for warehouses: Lighting power reduction can be 40% if using only 80% of the Area Category allowance (80% of Warehouse allowance reduces 0.45 W/ft² to 0.36 W/ft²), or if metal halide/high pressure sodium lighting is used 	
<p>§130.1(c)7: The following spaces will need to provide partial-OFF occupancy sensors that reduce the lighting power by at least 50% when unoccupied (but do not need to meet the to shut-OFF requirements of §130.1(c)1 since the spaces are occupied 24 hours/7 days a week):</p> <ul style="list-style-type: none"> • Stairwells and common area corridors that provide access to guestrooms or dwelling units of high-rise multifamily and hotel/motels buildings <ul style="list-style-type: none"> – Exception: Lighting power reduction can be 40% if using only 80% of the Area Category allowance: <ul style="list-style-type: none"> • 80% of corridor allowance reduces 0.60 W/ft² to 0.48 W/ft² • 80% of stair allowance reduces 0.65 W/ft² to 0.52 W/ft² / 80% of stair allowance in a licensed senior long-term or adult day care, senior support or special visual needs reduces 0.80 W/ft² to 0.64 W/ft² • General lighting in parking garages, parking areas and loading and unloading areas are allowed one control step between 20-50% of lighting power when unoccupied, and are limited to 500W control zones <ul style="list-style-type: none"> – Exception: Lighting power reduction control step can be between 20-60% if metal halide luminaires with a lamp plus ballast efficacy of >75 lumens/W are used 	
<p>§130.1(c)8: Hotel/motel guest rooms must provide either captive-card key, occupancy sensors or any other type of automatic control that can shut off all lighting (except one high efficacy fixture, per Table 150.0-A, switched separately from all other lighting and that is within 6 ft of the entry door) within 20 minutes of room being unoccupied.</p>	

Table 2: Shut-OFF Control Requirements: With Automatic Time-Switch, With Occupancy Sensor & Specific to Space Type

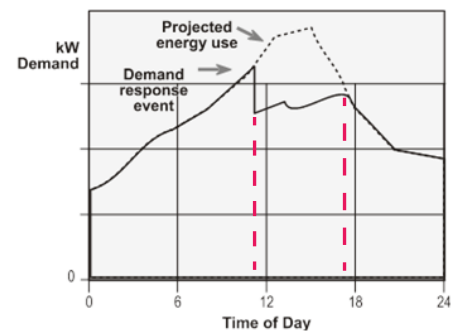
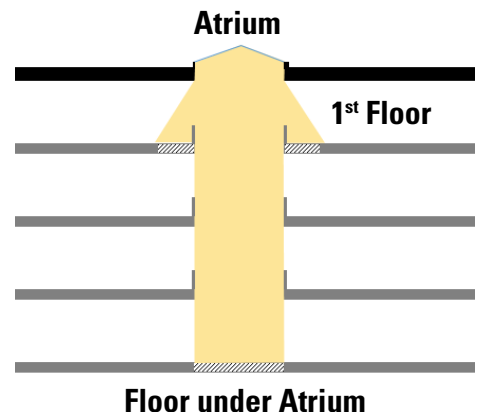
- **Automatic Daylighting Controls Section 130.1(d)** – All daylit zones are required to be shown on the floor plan and it is recommended the lighting plan be used
 - Automatic daylighting controls are required to adjust the general lighting power within daylit zones using the multi-level controls per Section 130.1(b), keeping the illuminance level stable as incoming daylight changes throughout the day
 - Spaces (not including parking garages) with general lighting power in all combined skylit and primary sidelit daylit zones $\geq 120\text{W}$ AND when fenestration is $\geq 24\text{ ft}^2$ (fenestration includes windows, skylights and glass doors) require automatic daylighting controls
 - Secondary daylighting control requirements are Prescriptively required per Section 140.6(d) when $\geq 120\text{W}$ of general lighting in secondary daylit zone(s) or when $\geq 240\text{W}$ of general lighting in primary + secondary daylit zone(s)
 - These controls can be traded away against other energy efficiency measures using the “detailed” performance approach (3D approach) but not with the “simplified” approach (Energy Pro)
 - Automatic daylighting control requirements also apply to parking garages when general lighting in combined primary and secondary sidelit daylit zones (not including daylit adaptation zones and dedicated ramps) is $\geq 60\text{W}$ AND when combined opening(s) are $\geq 36\text{ ft}^2$
 - Luminaires in each skylit, primary and secondary zone must be controlled separately from each other (if luminaire falls in both skylit and sidelit, it is to be controlled with skylit zone)
 - Photosensors located within the daylit zone must have at least one photosensor that is not readily accessible to unauthorized personnel
 - Accessibility for calibration adjustments must be readily accessible to authorized personnel but may be inside a locked case or under a cover which requires a tool for access
 - Exceptions:
 - Skylights that are shaded (including adjacent buildings or natural objects but not including building features attached to building) more than 1,500 daytime hours (8 am – 4 pm) per year
 - Sidelit areas from an overhang covering the entire width of the window (but not if there is window above the overhang) and meeting the following criteria:
 - South, East, West: Ratio of the overhang projection to the overhang rise is >1.5
 - North: Ratio of the overhang projection to the overhang rise is >1
 - Daylit zones in retail merchandise sales and wholesale showroom areas

General lighting is installed electric lighting that provides a uniform level of illumination throughout an area, exclusive of any provision for special visual tasks or decorative effect, exclusive of daylighting, and also known as ambient lighting.

- **Demand Responsive Lighting Controls Section 130.1(e)/110.12(c)** – Buildings, or lighting alteration projects, $>10,000\text{ ft}^2$ excluding spaces with $\text{LPD} \leq 0.5\text{W/ft}^2$, must be capable of automatically reducing lighting power in response to a Demand Response Signal using controls meeting the requirements of Section 110.12(a), such that total lighting power can be reduced by at least 15%
 - General lighting must be reduced in a manner consistent with the uniform level of illumination requirements in Table 130.1-A
 - Exception: Spaces where a health or life safety statute, ordinance or regulation does not permit the lighting to be reduced are not required to have demand responsive controls installed and do not count toward the 10,000 ft^2 threshold



Atrium skylit daylit area includes the floor area directly under the atrium and the top floor area directly adjacent to the atrium.



Example of electricity end use reducing kW demand for an 11AM to 5 PM demand response event

Mandatory Outdoor Lighting Controls Section 140.2

- **Luminaire Cutoff Requirements** (Backlight, Uplight, Glare or "BUG")
 Section 130.2(b) – Luminaires with $\geq 6,200$ initial lumens must comply with the BUG requirements of CALGreen (Title 24, Part 11 Section 5.106.8 and Table 5.106.8)
 - Exceptions: Signs; Façades, public monuments, statues, vertical surface of bridges; Temporary lighting when illuminating public right of way of public hardscape; Luminaires attached to multifamily/hotel/motel building(s) and controlled from within the dwelling unit/hotel room

Max. Allowable BUG Ratings: Title 24, Part 11, Table 5.106.8							
Allowable Rating			LT 0	LT 1	LT2	LT 3	LT 4
Maximum Allowable	Backlight Rating	Luminaire >2 mounting heights (MH) from property line	N/A	No Limit	No Limit	No Limit	No Limit
		Luminaire back hemisphere is 1-2 MH from property line	N/A	B2	B3	B4	B4
		Luminaire back hemisphere is 0.5-1 MH from property line	N/A	B1	B2	B3	B3
		Luminaire back hemisphere is <0.5 MH from property line	N/A	B0	B0	B1	B2
	Uplight Rating	For Area Lighting (parking, sales/storage lots)	N/A	U0	U0	U0	U0
		For all other lighting including decorative luminaires	N/A	U1	U2	U3	U4
	Glare Rating	Luminaire >2 mounting heights (MH) from property line	N/A	G1	G2	G3	G4
		Luminaire front hemisphere is 1-2 MH from property line	N/A	G0	G1	G1	G2
		Luminaire front hemisphere is 0.5-1 MH from property line	N/A	G0	G0	G1	G1
		Luminaire front hemisphere is <0.5 MH from property line	N/A	G0	G0	G0	G1

Backlight Rating IES TM-15-11 Table A-1 (Max. Zonal Lumens) with the inclusion of Energy Code Outdoor Lighting Zones					
Secondary Solid Angle	B0 LT 0	B1 LT 1	B2 LT 2	B3 LT 3	B4 LT 4
Backlight High: 60-80°	110	500	1,000	2,500	5,000
Backlight Medium: 30->60°	220	1,000	2,500	5,000	8,500
Backlight Low: 0-<30°	110	500	1,000	2,500	5,000
Uplight Rating IES TM-15-11 Table A-2 (Max. Zonal Lumens) with the inclusion of Energy Code Outdoor Lighting Zones					
Secondary Solid Angle	U0 LT 0	U1 LT 1	U2 LT 2	U3 LT 3	U4 LT 4
Uplight High: 100-180°	0	10	50	500	1,000
Uplight Low: 90->100°	0	10	50	500	1,000

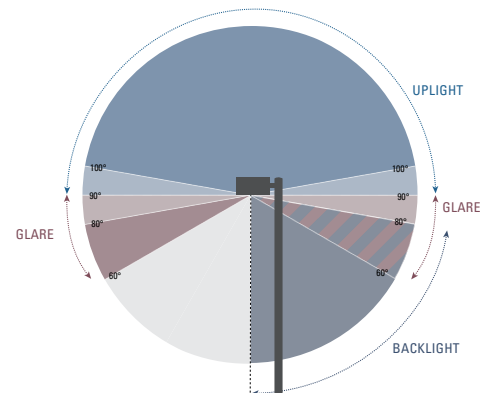
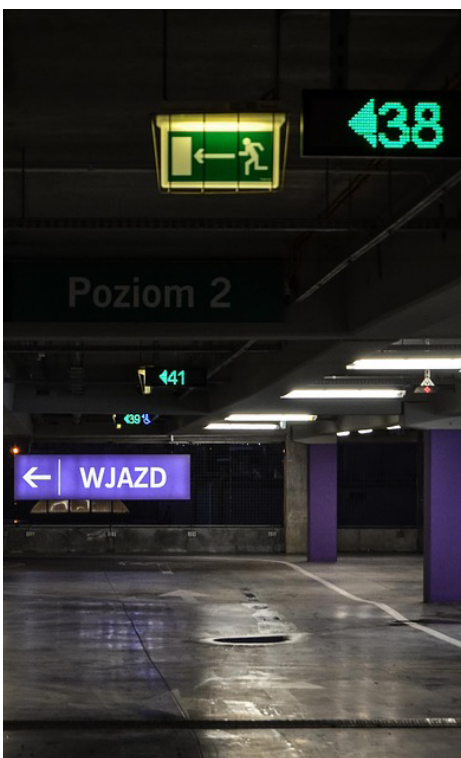


IMAGE: CLTC UC DAVIS

Glare Rating IES TM-15-11 Table A-3 (Max. Zonal Lumens) with the inclusion of Energy Code Outdoor Lighting Zones										
Asymmetrical Luminaire Types (Type I, II, III, IV)						Symmetrical Luminaire Types (Type V, V square)				
Secondary Solid Angle	G0 LT 0	G1 LT 1	G2 LT 2	G3 LT 3	G4 LT 4	G0 LT 0	G1 LT 1	G2 LT 2	G3 LT 3	G4 LT 4
Forward Very High: 80-90°	10	100	225	500	750	10	100	225	500	750
Backlight Very High: 80-90°	10	100	225	500	750	10	100	225	500	750
Forward High: 60-<80°	660	1,800	5,000	7,500	12,000	660	1,800	5,000	7,500	12,000
Backlight High: 60-<80°	110	500	1,000	2,500	5,000	660	1,800	5,000	7,500	12,000



- **Independently Controlled Section 130.2(c)** – Outdoor lighting must be separated from all other electric loads
- **Daylight Availability Section 130.2(c)1** - All outdoor lighting must be capable of automatically shutting off lights when daylight is available using photo control, an astronomical time switch or any other control that can automatically turn OFF lighting when daylight is available
- **Automatic Scheduling Controls Section 130.2(c)2** – Must:
 - Provide automatic scheduling controls that can reduce lighting power by at least 50% (but no more than 90%) and be capable of separately turning OFF lighting during scheduled unoccupied times
 - Have at minimum of two nighttime periods with independent lighting levels (dim or OFF) which may include a 2-hour override function to turn lights ON
 - Acceptance testing required by certified ATT to verify occupied/unoccupied periods programmed, or use default schedules
 - These scheduling controls may be installed in combination with other outdoor lighting controls (such as motion sensors) but not instead of other controls
- **Motion Sensing Controls Section 130.2(c)3** – Must:
 - Be able to reduce lighting power of each applicable luminaire by at least 50% (but no more than 90%) and be capable of separately turning OFF lighting during scheduled unoccupied times
 - Be capable of reducing power within 15 minutes of area being vacant and be able to come back on again when occupied
 - Have a maximum 1,500 luminaire wattage controlled by a single sensor
 - Be installed when luminaire is within 24 feet of ground AND is wall-mounted luminaire for Building Façade, Ornamental Hardscape or Outdoor Dining when using bilaterally symmetric luminaires (wall pack)
 - Be installed when luminaire is within 24 feet of ground AND is any other luminaire (not wall pack) when not being used for Building Façade, Ornamental Hardscape, Outdoor Dining or Outdoor Sales Frontage
 - Exceptions:
 - Luminaires with max. rated wattage of 40W or less
 - Exempt lighting applications per Section 140.7(a)
 - Lighting subject to a health or life safety statute, ordinance or regulation may have a minimum time-out period longer than 15 minutes, or a minimum dimming level above 50%, when necessary to comply with the applicable law



Mandatory Sign Lighting Controls Section 130.3

- **Indoor Sign Lighting Section 130.3(a)1** – All indoor sign lighting, other than illuminated exit signs, must be controlled with an automatic time-switch control or an astronomical time-switch control
- **Outdoor Sign Lighting Section 130.3(a)2** – All outdoor sign lighting must be controlled with a photosensor and an automatic time-switch, or astronomical time switch control
 - When signs are illuminated at night, and for more than one hour during daylight hours, they are considered “ON” both day and night, and must have dimmers capable of automatically dimming light output by 65% during nighttime hours
 - Exception: Signs in tunnels and large covered areas that are intended to be illuminated 24 hours/day and 365 days/year
- **Demand Responsive EMC Control Section 110.12** – Electronic Message Center (EMC) with >15 kW of new connected lighting power must have controls capable of reducing lighting power by 30% in response to a demand response sign
 - Exception: Lighting for EMCs that is not permitted to be reduced due to health and safety regulations

Forms: Which and When

Along with a Building Permit Application, the following forms are required.

During Design:

Indoor Lighting

- **NRCC-LTI-E** – Prescriptive Indoor Lighting OR
NRCC-PRF-01-E – Performance - Lighting in Conditioned Spaces Used to Show Compliance
 - Completed and signed by permit applicant (responsible designer, installing contractor or building owner)
 - Submitted by permit applicant at permit application or plan check
 - Revise if lighting design or features are changed so that compliance is still shown

Outdoor Lighting

- **NRCC-LTO-E** – Prescriptive Outdoor Lighting
 - Prescriptive Outdoor Lighting
 - Completed and signed by permit applicant (responsible designer, installing contractor or building owner)
 - Submitted by permit applicant at permit application or plan check

Sign Lighting

- **NRCC-LTS-E** – Prescriptive Sign Lighting
 - Completed and signed by permit applicant (responsible designer, installing contractor or building owner)
 - Submitted by permit applicant at permit application or plan check
 - Revise if lighting design or features are changed so that compliance is still shown

During Construction:

Indoor Lighting

- **NRCI-LTI-01-E** – Indoor Lighting – All
 - Completed by the installing contractor and available for Inspector when onsite and then provided to building owner
- **NRCI-LTI-02-E** – Energy Management Control System (EMCS) or Lighting Control System
 - Completed by the installing contractor and available for the Inspector when onsite and then provided to building owner
- **NRCI-LTI-04-E** – Two Interlocked Lighting Systems
 - Completed by the installing contractor and available for the Inspector when onsite, when applicable, and then provided to building owner
- **NRCI-LTI-05-E** – Power Adjustment Factors (PAF)
 - Completed by the installing contractor and available for the Inspector when onsite, when applicable, and then provided to building owner
- **NRCI-LTI-06-E** – Additional Video Conference Studio Lighting
 - Completed by the installing contractor and available for the Inspector when onsite, when applicable, and then provided to building owner

- **NRCA-LTI-02-A** – Indoor Lighting – Automatic Shut-Off Control
 - Completed and signed by Acceptance Test Technician (when required)
 - Available for the Inspector when onsite, and then provided to building owner
- **NRCA-LTI-03-A** – Indoor Lighting – Automatic Daylighting Control
 - Completed and signed by Acceptance Test Technician (when required)
 - Available for the Inspector when onsite, and then provided to building owner
- **NRCA-LTI-04-A** – Indoor Lighting – Demand Responsive Control
 - Completed and signed by Acceptance Test Technician (when required)
 - Available for the Inspector when onsite, and then provided to building owner
- **NRCA-LTI-05-A** – Indoor Lighting – Institutional Tuning PAF
 - Completed and signed by Acceptance Test Technician (when required)
 - Available for the Inspector when onsite, and then provided to building owner

Outdoor Lighting

- **NRCI-LTO-01-E** – For all newly installed outdoor lighting systems
 - Completed by the installing contractor and available for the Inspector when onsite, when applicable, and then provided to building owner
- **NRCI-LTO-02-E** – Energy Management Control System (EMCS) or Lighting Control System
 - Completed by the installing contractor and available for the Inspector when onsite, when applicable, and then provided to building owner
- **NRCA-LTO-02-A** – Outdoor Lighting Controls
 - Completed and signed by Acceptance Test Technician
 - Available for the Inspector when onsite, and then provided to building owner

Sign Lighting

- **NRCI-LTS-01-E** – For all newly installed sign lighting systems
 - Completed by the installing contractor and available for the Inspector when onsite, when applicable, and then provided to building owner

Notes:

- Which NRCI and NRCA forms are required is based on controls installed and will vary by project

For More Information

Primary Documents

- Energy Code Section 110.9 – Mandatory Requirements for Lighting Controls and Control Systems, Track Lighting Current Limiters and Supplementary Overcurrent Protection Panels
energycodeace.com/site/custom/public/reference-ace-2019/Documents/section1109mandatoryrequirementsforlightingcontrols.htm
- Energy Code Section 110.12 – Mandatory Requirements for Demand Management including Demand Responsive Lighting Controls
energycodeace.com/site/custom/public/reference-ace-2019/Documents/section11012mandatoryrequirementsfordemandmanagement.htm
- Energy Code Section 130.0(d) – Lighting Systems and Equipment and Electrical Power Distribution Systems including Luminaire Classification and Power
energycodeace.com/site/custom/public/reference-ace-2019/Documents/section1300lightingsystemsandequipmentandelectricalpowerdistribu.htm
- Energy Code Section 130.1 – Mandatory Indoor Lighting Controls including Control Interaction Requirements
energycodeace.com/site/custom/public/reference-ace-2019/Documents/section1301mandatoryindoorlightingcontrols.htm
- Energy Code Section 130.2 – Mandatory Outdoor Lighting Controls including Luminaire Cutoff Requirements
energycodeace.com/site/custom/public/reference-ace-2019/Documents/section1302outdoorlightingcontrolsandequipment.htm
- Energy Code Section 130.3 – Mandatory Sign Controls
energycodeace.com/site/custom/public/reference-ace-2019/Documents/section1303signlightingcontrols.htm
- Energy Code Section 130.4 – Lighting Control Acceptance and Installation Certificate Requirements
energycodeace.com/site/custom/public/reference-ace-2019/Documents/section1304lightingcontrolacceptanceandinstallationcertificatere.htm
- Energy Code Section 141.0(a) – Addition of Indoor/Outdoor/Sign Lighting System(s) to Existing Buildings/Systems
energycodeace.com/site/custom/public/reference-ace-2019/Documents/section1410additionsalterationsandrepairs-to-existing-nonresidential1.htm
- Energy Code Section 141.0(b)2 – Altered Indoor/Outdoor/Sign Lighting System(s) to Existing Buildings/Systems
energycodeace.com/site/custom/public/reference-ace-2019/Documents/section1410additionsalterationsandrepairs-to-existing-nonresidential1.htm
- Nonresidential Reference Appendix NA7 (NA7.6 – NA7.9) – Installation and Acceptance Requirements for Nonresidential Buildings and Covered Process
NA7: energycodeace.com/site/custom/public/reference-ace-2019/Documents/appendixna7installationandacceptancerequirementsfornonresidential.htm
NA7.6: energycodeace.com/site/custom/public/reference-ace-2019/Documents/na76lightingcontrolacceptancerequirements.htm
NA7.9: energycodeace.com/site/custom/public/reference-ace-2019/Documents/na79signlightingacceptancetests.htm
- Nonresidential Reference Appendix NA8 – Library of Default Luminaire Power
energycodeace.com/site/custom/public/reference-ace-2019/Documents/appendixna8luminairepower1.htm

California Energy Commission Information & Services

Title 24, Part 6

- Energy Standards Hotline: 1-800-772-3300 (Free) or Title24@energy.ca.gov
- Online Resource Center:
energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/online-resource-center/acceptance
 - The Energy Commission's main web portal for Energy Standards, including information, documents, and historical information

Additional Resources

- California Lighting Technology Center (CLTC) Guide:
 - Nonresidential Lighting: What's New in the 2019 Title 24, Part 6 Code?
cltc.ucdavis.edu/article/nonresidential-lighting-whats-new-2019-title-24-part-6-energy-code
- Illuminating Engineering Society (IES):
www.ies.org
 - Technical Memorandum: IES TM-15-11 - Luminaire Classification System for Outdoor Luminaires
www.ies.org/product/luminaire-classification-system-for-outdoor-luminaires/
 - IES TM-15-11 BUG Ratings Addendum
www.ies.org/wp-content/uploads/2017/03/TM-15-11BUGRatingsAddendum.pdf
- Energy Code Ace:
EnergyCodeAce.com
 - An online “one-stop-shop” providing free resources and training to help appliance and building industry professionals decode and comply with Title 24, Part 6 and Title 20. The site is administered by California's investor-owned utilities.
Of special interest:
 - Title 24, Part 6 Fact Sheets:
EnergyCodeAce.com/content/resources-fact-sheets
 - Healthcare Facilities 2019
 - Nonresidential Daylighting and Daylighting Controls 2019
 - Nonresidential Electrical Power Distribution (EPD) 2019
 - Title 24, Part 6 Trigger Sheets:
EnergyCodeAce.com/content/resources-trigger-sheets
 - Nonresidential Interior Lighting Alterations
 - Nonresidential Exterior Lighting
 - Title 24, Part 6 Application Guides:
energycodeace.com/content/resources-ace/file_type=application-guide
 - Nonresidential Lighting and Electrical Power Distribution 2019
 - Title 24, Part 6 Training
energycodeace.com/training
 - 2019 Title 24, Part 6 Essentials — Nonresidential Standards: Indoor Lighting
 - 2019 Title 24, Part 6 Essentials on Demand — Nonresidential Standards: Indoor Lighting Controls
 - 2019 Title 24, Part 6 Essentials on Demand — Nonresidential Standards: Using the Lighting Wheel
 - Decoding 2019 Title 24, Part 6: Let's Talk Healthcare Facilities
 - Title 20 Lighting FAQ Fact Sheet:
EnergyCodeAce.com/content/title-20-resources

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