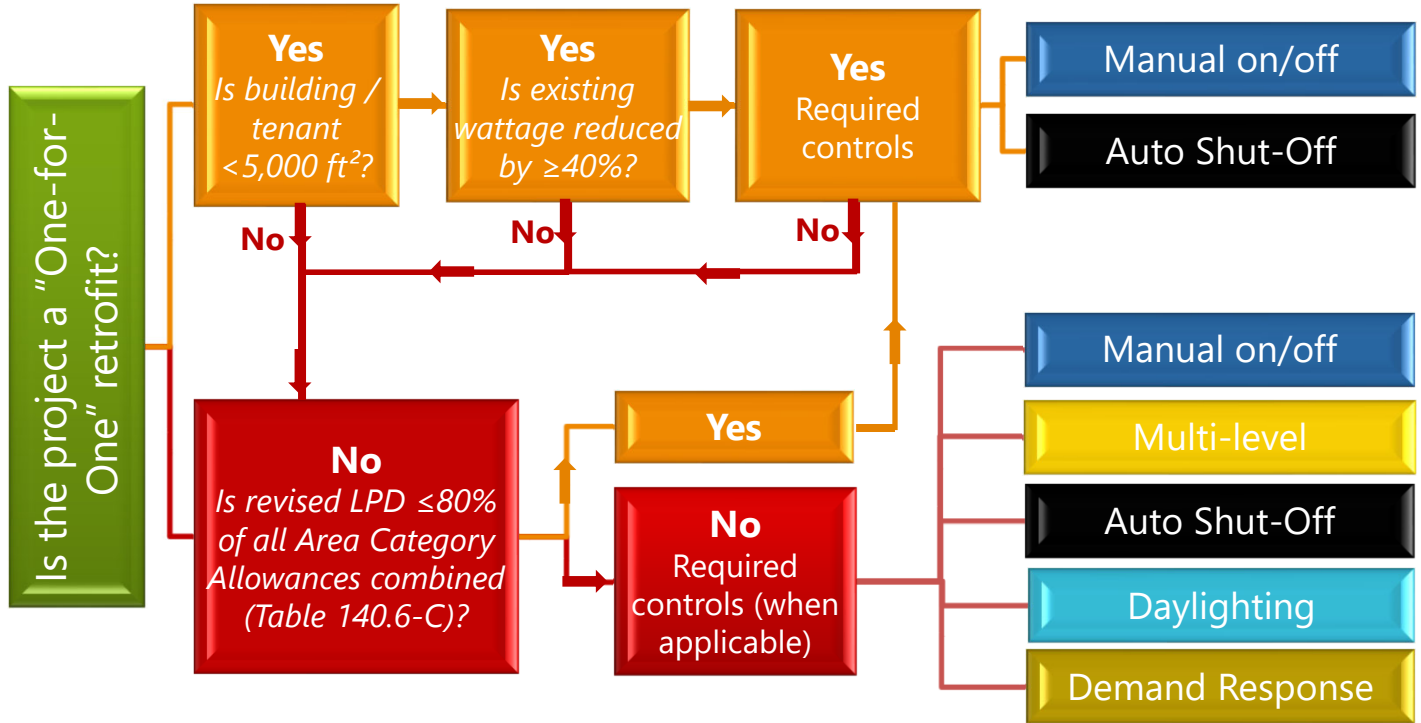


Let's Talk Nonresidential Indoor Lighting



Unique Room ID:		Room Area (ft ²):		
Primary Function: _____ (circle or write in) General: Corridor/ Stairs/ Lobby / Copy / Elect/ Mech/ Laundry/ Locker School: Classroom/ Multipurpose ≥1,000 ft ² or <1,000 ft ² / Auditorium Retail: Merchandise/ Grocery/ Fitting Rm/ Concourse/ Mall Office: ≤250 ft ² / >250 ft ² / Open Office/ Conference/ Breakroom Public: Library Reading or Stack/ Museum Display or Restore/ Convention/ Civic Mtg/ Hotel/ Worship Industrial: Low Bay 25'/ High Bay ≥25'/ Precision Restaurant: Fast Food/ Dining Leisure/ Kitchen Theater: Motion Picture/ Live/ Video Conferencing Specialized: Auto Repair/ Beauty Salon/ Bank Area Storage: Warehouse/ Shipping Sports: Sports Arena/ Exercise Area Bathroom: Single Stall or Multi Stall Healthcare: Pharmacy or lab or _____ Transportation: Baggage or Ticketing or Parking Garage				
Fenestration Area: ≥24 ft ² (not including Retail sidelit) / Parking: ≥36 ft ² <input type="checkbox"/> Yes Sketch out room including fenestration location/top of window height/Skylight rough opening and floor to skylight height in ft, and which fixtures are near fenestration) overhangs on back side of paper <input type="checkbox"/> Primary zone controlled with photosensor(s) <input type="checkbox"/> Primary AND secondary zones controlled with photosensor(s) <input type="checkbox"/> None				
On/Off Controls (select one) <input type="checkbox"/> Manual on-off: <input type="checkbox"/> Control in room <input type="checkbox"/> Control outside room <input type="checkbox"/> Control inaccessible to unauthorized personnel <input type="checkbox"/> None: Not manual (i.e. controlled at the circuit panel)		Automatic Shut-Off (select one) <input type="checkbox"/> Occupancy sensor <input type="checkbox"/> Partial-on occupancy sensor <input type="checkbox"/> Vacancy sensor <input type="checkbox"/> Partial-off occupancy sensor <input type="checkbox"/> Countdown timer _____ max. minutes <input type="checkbox"/> Automatic time-switch (serving building) <input type="checkbox"/> None		
Multi-Level Controls (select one) <input type="checkbox"/> Provided: Circle method used (dimmer, A/B lamp/fixture) <input type="checkbox"/> None		General lighting vs. Other lighting Use column E to document: <ul style="list-style-type: none"> General Lighting: Ambient lighting Other Lighting: Specialty lgtg switched separately from general 		
(E) Fixture Name	Count #	(E) Fixture wattage	Multi-level Control (circle type)	Switched Separately
			Dimming/ Alternate lamp/ Alternate fixture	<input type="checkbox"/> General lgtg <input type="checkbox"/> Other
			Dimming/ Alternate lamp/ Alternate fixture	<input type="checkbox"/> General lgtg <input type="checkbox"/> Other
			Dimming/ Alternate lamp/ Alternate fixture	<input type="checkbox"/> General lgtg <input type="checkbox"/> Other
			Dimming/ Alternate lamp/ Alternate fixture	<input type="checkbox"/> General lgtg <input type="checkbox"/> Other
			Dimming/ Alternate lamp/ Alternate fixture	<input type="checkbox"/> General lgtg <input type="checkbox"/> Other
			Dimming/ Alternate lamp/ Alternate fixture	<input type="checkbox"/> General lgtg <input type="checkbox"/> Other
			Dimming/ Alternate lamp/ Alternate fixture	<input type="checkbox"/> General lgtg <input type="checkbox"/> Other

Project name (auto filled)

To support use of Energy Code Ace NR LTG Audit Tool

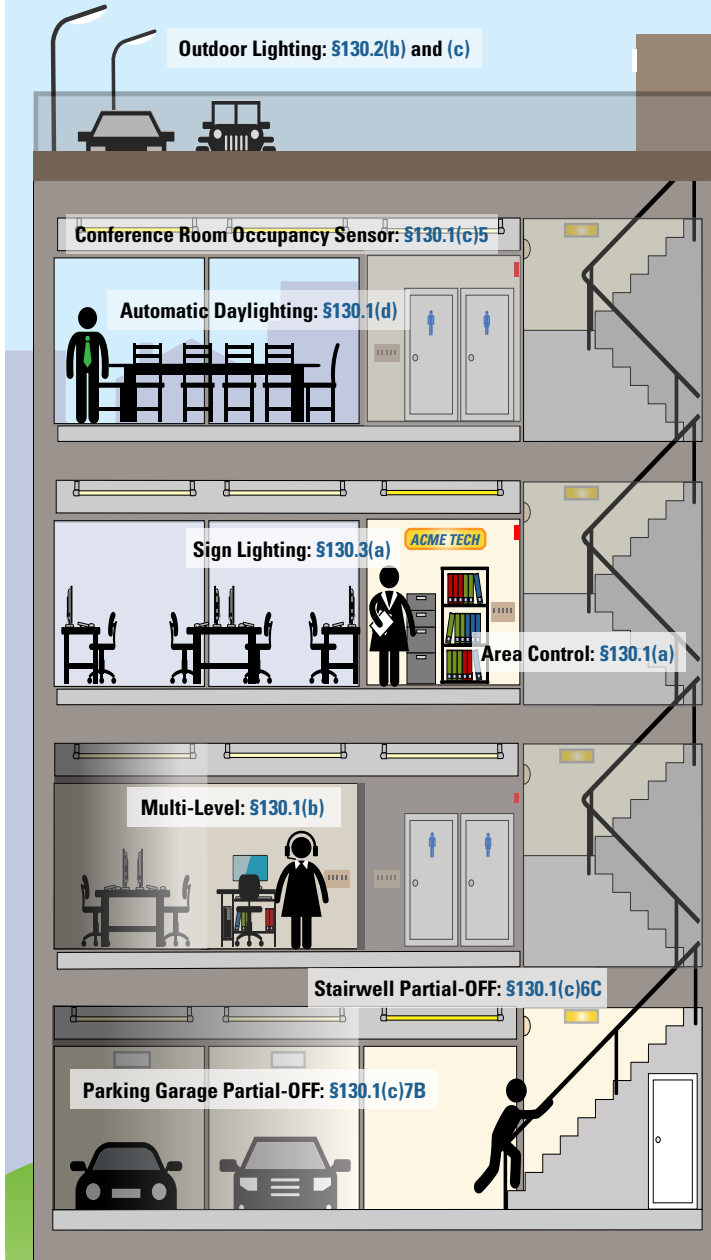


Outdoor Lighting Controls

§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.



Demand Responsive Controls

§130.1(e) Controls that can reduce indoor building lighting power in response to a Demand Response Signal are required.

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	General	<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. 	
		Astronomical	<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. 	
		Multi-Level	<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.
		Outdoor	<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.


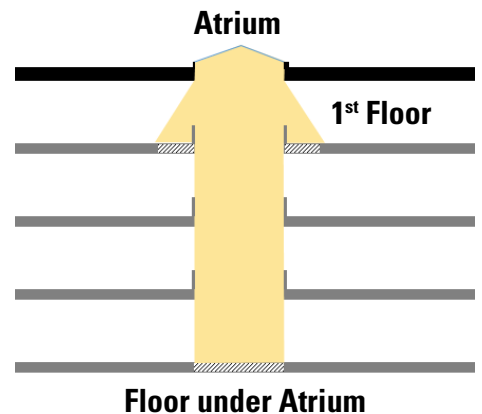
When Using Automatic Time-Switch for Shut-OFF Controls (Typically Serving an Entire Building)	When Using Occupancy Sensors for Shut-OFF Controls (Serving Each Room)
Manual-ON mode may be included as a feature.	<div style="display: flex; align-items: center; justify-content: center;"> <div style="margin-right: 10px;">Not Required</div>  </div>
§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). <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 	
§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. <ul style="list-style-type: none"> • Exception: Retail stores and associated malls, restaurants, grocery stores, churches and theaters 	
Shut-Off Controls Specific to Space Type	
§130.1(c)5: Occupancy sensors used to shut off 100% of the lighting when an office ≤250 ft ² , multipurpose rooms <1,000 ft ² , and classrooms, restrooms and conference rooms of any size are unoccupied. The type of occupancy sensor depends on if space triggers multi-level controls §130.1(b) <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 	
§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). <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 	
§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): <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 	
§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.	

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

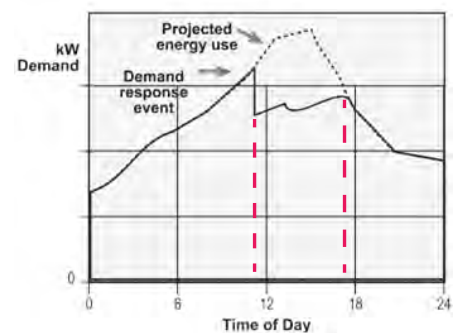


Atrium skylit daylit area includes the floor area directly under the atrium and the top floor area directly adjacent to the atrium.



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 $\text{LPD} \leq 0.5\text{W}/\text{ft}^2$, must be capable of automatically reducing lighting power in response to a Demand Response Signal using controls meeting the requirements of §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



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	LT 2	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

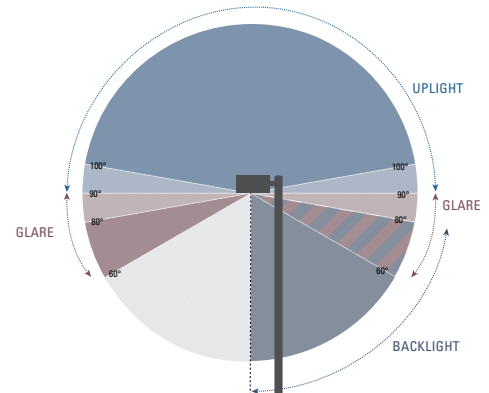


IMAGE: CLTC UC DAVIS

Glare Rating										
IES TM-15-11 Table A-3 (Max. Zonal Lumens) with the inclusion of Energy Code Outdoor Lighting Zones										
Secondary Solid Angle	Asymmetrical Luminaire Types (Type I, II, III, IV)					Symmetrical Luminaire Types (Type V, V square)				
	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/section1410additionalterationsandrepairs-toexistingnonresidential1.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/section1410additionalterationsandrepairs-to-existingnonresidential1.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/title24/orc/
 - 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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Nonresidential Interior Lighting – Alterations

Lighting Alteration Compliance Methods

One-for-One Alteration Method (typically called retrofit projects) (§141.0(b)2iii) includes permanently changing the light source, changing the optical system (e.g., reflectors), replacing lamps along with new ballast and/or drivers, and replacing the entire luminaire at the existing location. Limited to buildings and tenant spaces (in multi-tenant buildings) ≤ 5,000 ft² that can show 40% reduction of installed wattage. Energy Code is not triggered when ≤ 50 luminaires per floor or tenant space are altered per year.

Entire Luminaire Alteration Method (§141.0(b)2i and ii) includes removing and reinstalling ≥ 10% of the existing luminaires, replacing and/or removing ≥ 10% of luminaires in an enclosed space, and redesign of the lighting system. Excludes enclosed spaces with only one luminaire. The Area Category Method (§140.6) is used to determine the maximum wattage allowance per space type, which will dictate lighting control requirements.

Rewiring Alteration (§141.0(b)2l) includes replacing or adding lighting circuits, and relocating, modifying or replacing wiring between switch, panels and/or luminaires. Alterations to components of the lighting wiring must meet all applicable requirements in §141.0(b)2l. For example, relocating an existing area control must meet all applicable requirements in §130.1(a), since they are included in §141.0(b)2l. These projects will need to meet the manual area control requirements. Separation of general lighting from other types of lighting such as decorative lighting is only required for new or complete replacement of lighting circuits. Existing controls functionality must be maintained, but they may be expanded upon.

When is the Energy Code Triggered? Example Project Scopes

Replacing/upgrading lamp and nothing else being done to the luminaire (<i>considered a repair</i>)	No
Replacing/upgrading <10% of the luminaires in an enclosed space (<i>alteration exception</i>)	No
Replacing/upgrading ≥10% of the lamps and replacing ballast with same ballast type per enclosed space (<i>considered an alteration</i>)	Yes
Upgrading luminaire by adding an LED driver or upgrading the ballast (<i>considered a One-for-One Alteration</i>)	Yes
Removing luminaires and nothing else (<i>not considered an alteration</i>)	No
Removing and upgrading ≥10% luminaires (upgrading ballast and/or adding LED driver) (<i>considered an alteration</i>)	Yes
Upgrading lamp and ballast/driver for an enclosed space with only one luminaire (<i>alteration exception</i>)	No
Adding lighting controls to a space and nothing else (<i>rewiring exception</i>)	No
Adding/replacing lighting circuits (<i>rewire trigger for area controls</i>)	Yes
Adding walls and not changing the luminaires (area controls required) (<i>not considered an alteration</i>)	No
Taking down ≥10% of the luminaires, then putting them back up for asbestos abatement (<i>alteration exception</i>)	No
Taking down ≥10% of the luminaires, then putting them back up in same place (i.e., painting the ceiling) (<i>considered an alteration</i>)	Yes
Altering the luminaires while also remodeling the space (i.e., changing or removing walls) (<i>considered an alteration</i>)	Yes
Changing the reflected ceiling plan (relocating and/or adding luminaires) (<i>considered an alteration</i>)	Yes

Lighting Alteration Compliance Method Options: Retrofit (One-for-One Alteration) Project

Project Scope has Triggered Code <i>Determine which compliance method can be used</i>	One for One	Using ≤80% LPD	Using >80% LPD
When project alters >50 luminaires a year in a ≤5,000 ft² building or in each ≤5,000 ft² tenant space (or all common areas) in a multi-tenant building while reducing the existing wattage by ≥40% of all altered luminaires combined	Yes	Yes	Yes
Project limited to: <ul style="list-style-type: none"> • >50 luminaires altered in a year • >5,000 ft² building or each >5,000 ft² tenant space (or all common areas) in a multi-tenant building AND/OR • Reducing the existing wattage by <40% of all altered luminaires combined 	No	Yes	Yes
Project is not eligible for the One-for-One Alteration Method but is able to show that post-altered + existing-to-remain luminaire wattage of each room is ≤80% of the wattage allowed per Table 140.6-C (Area Category Method)	No	Yes	Yes
Project is not eligible for the One-for-One Alteration Method but is able to show that post-altered + existing-to-remain luminaire wattage of each room is >80% of the wattage allowed per Table 140.6-C (Area Category Method)	No	No	Yes

If a retrofit project also includes changing the reflected ceiling plan by adding or relocating luminaires, or if rewiring, see Entire Luminaire Alteration Method

**Lighting Alteration Compliance Method Options:
Entire Luminaire Alteration Project**

Project Scope has Triggered Code <i>Determine which compliance method can be used</i>	One for One	Using ≤80% LPD	Using >80% LPD
Project is able to show that post-altered + existing-to-remain luminaire wattage of each room is ≤80% of the wattage allowed per Table 140.6-C (Area Category Method)	No	Yes	Yes
Project is able to show that post-altered + existing-to-remain luminaire wattage of each room is >80% of the wattage allowed per Table 140.6-C (Area Category Method)	No	No	Yes
Along with changing the reflected ceiling plan, the space will also be remodeled (i.e., revised walls, ceilings and floors)	Yes	Yes	Yes
Rewiring the space (or the building) including new circuits	See rewiring alteration		

Mandatory Controls <i>Requirements Based on Lighting Alteration Compliance Method Used</i>		Entire Luminaire Alteration Method <i>Excluding spaces with only 1 luminaire</i>		One-for-One Alteration Method
Acceptance testing requirements of §130.4 are not required for alterations where lighting controls are added/altere to control ≤20 luminaires for the entire permitted project (for indoor, outdoor and sign lighting)		Using >80% of allowed LPD	Using ≤80% of allowed LPD	Total Wattage Reduced ≥40%
Manual Area Controls (on/off): §130.1(a)1, 2 and 3 For each enclosed space • Excluding >0.2 W/ft ² egress lighting		Yes	Yes	Yes
		<i>Separate switching for "general" and "other" not required for shared circuits</i>		
Multi-level Control: §130.1(b) • Enclosed spaces ≥ 100 ft ² AND • Connected lighting load >0.5 W/ft ² • Excluding restrooms • Excluding Healthcare Facilities		Yes <i>Only for modified luminaires</i>	No	No
Auto Shut-Off Control: §130.1(c)1-8 <i>Excluding Healthcare Facilities</i>	Whole Bldg. Shut-Off: §130.1(c)1-4	Yes	Yes	Yes
		<i>Separate switching for "general" and "other" not required for shared circuits</i>		
	Partial-ON, Vacancy or Occupancy Sensor: §130.1(c)5	Yes	Yes	Yes
		<i>In offices ≤ 250 ft², multipurpose rooms < 1,000 ft², and classrooms, conference rooms and restrooms of any size</i>		
	Partial-OFF: §130.1(c)6-7 §130.1(c)6A: Warehouse aisle/stacks §130.1(c)6B: Library book stacks §130.1(c)6C and 7A: Stairs and corridors §130.1(c)7B: Parking garages	Yes	Yes	Yes
	Hotel/motel room auto shut-off: §130.1(c)8	Yes	Yes	Yes
Primary Daylight Control: §130.1(d) • ≥ 120 watts in primary/skylit zone(s) (parking garage ≥ 60 watts) AND • ≥ 24 ft ² fenestration (parking garage ≥ 36 ft ²) • Excluding areas shaded per Exceptions 1 and 2 • Excluding retail merchandise sales/wholesale showroom sidelit zones		Yes	No	No
Demand Response: §110.12(c) • Permitted area >10,000 ft ² • Excluding spaces ≤ 0.5 W/ft ² • Excluding where health & safety do not permit reduced lighting		Yes	No	No

Operation of existing controls must not be removed or altered with lighting alteration project.

See Title 20 Appliance Efficiency Regulations for additional LED General Service and Small Diameter Directional Lamp requirements.

For More Information

Primary Sources

- Energy Code Section 110.9 – Mandatory Requirements for Lighting Controls
energycodeace.com/site/custom/public/reference-ace-2019/Documents/section1109mandatoryrequirementsforlightingcontrols.htm
- Energy Code Section 110.12 – Mandatory Requirements for Demand Management
energycodeace.com/site/custom/public/reference-ace-2019/Documents/section11012mandatoryrequirementsfordemandmanagement.htm
- Energy Code Section 130.1 – Mandatory Indoor Lighting Controls
energycodeace.com/site/custom/public/reference-ace-2019/Documents/section1301mandatoryindoorlightingcontrols.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 140.6 – Prescriptive Requirements for Indoor Lighting
energycodeace.com/site/custom/public/reference-ace-2019/Documents/section1406prescriptiverequirementsforindoorlighting.htm
- Energy Code Section 141.0 – Additions, Alterations, and Repairs to Existing Nonresidential, High-Rise Residential, and Hotel/Motel Buildings, to Existing Outdoor Lighting, and to Internally and Externally Illuminated Signs
energycodeace.com/site/custom/public/reference-ace-2019/Documents/section1410additionsalterationsandrepairsstoexistingnonresidential1.htm
- Title 20 Appliance Efficiency Regulations
energycodeace.com/content/reference-ace-t20-tool

California Energy Commission Information & Services

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

Additional Resources

- California Lighting Technology Center (CLTC) Guides:
 - 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
- 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:
 - Fact Sheets
energycodeace.com/content/resources-fact-sheets/
 - Healthcare Facilities 2019
 - Nonresidential Daylighting and Daylighting Controls 2019
 - Nonresidential Electrical Power Distribution (EPD) 2019
 - Nonresidential Mandatory Lighting Controls 2019
 - State-Regulated Lamps - Lighting the Way to Efficiency
 - Title 20 Lighting FAQ
 - Application Guides
energycodeace.com/content/resources-ace/file_type=application-guide
 - Nonresidential Lighting and Electrical Power Distribution 2019
 - Training
EnergyCodeAce.com/training
 - 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
 - Decoding What’s New: Let’s Talk 2019 Title 24, Part 6 – Nonresidential

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Decoding 2019 Alterations

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Let's Talk 2019 Nonresidential Indoor Lighting



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Who Are We?



Gina Rodda
Gabel Energy
gina@gabelenergy.com

Host: Gina Rodda

Gina Rodda, our host for the Decoding Talk series, is a Certified Energy Analyst (CEA) through CABEC, and LEED Accredited Professional (AP).

She is involved in providing residential and non-residential energy calculations for a variety of building types throughout California; an instructor of full day trainings; subject matter expert supporting future code development; aids the improvement to tools and resources supporting energy compliance through the private utility programs and the Energy Commission.

Gina has been in the energy modeling field since 1991.



BUILDING ENERGY ANALYSIS +
ENERGY CODE COMPLIANCE



Who Are We?



Mike Hicks
IES, Inc.
mhicks@iesnational.com



Co-Host: Mike Hicks

Mike Hicks, Program Manager, IES, Inc.

He is a member of the National Lighting Contractors Association of America (NLCAA).

He has spent his entire career honing his skills in the Energy Efficiency Industry with over 8 years as a Journeyman Electrician and job-site Superintendent and the past 3-years as a Senior Program Manager involved with the direct execution of over 300 energy efficient lighting projects for commercial and industrial Clients throughout the country.

5



Decoding What's New



- ✦ When a lighting alteration project triggers (and does not trigger) compliance with the Energy Code
- ✦ Audit tips and tricks supporting compliance pathways to minimize existing lighting control changes
- ✦ All the compliance pathways available under the alteration requirements of the 2019 Energy Code and the advantages of each approach
- ✦ Documenting compliance, including the role of a Certified Acceptance Test Technician (ATT)

6



Agenda

Agenda for Today Approx. Length

- ✦ Welcome..... 10 minutes
- ✦ Why?!..... 5 minutes
- ✦ Let's Talk
 - ✧ Challenge A: 20 minutes
 - ✧ Challenge B: 35 minutes
 - ✧ Challenge C: 20 minutes
 - ✧ Challenge D: 20 minutes
- ✦ Next Steps..... 10 minutes
- ✦ Wrap Up..... 2 minutes



Why?





Handouts

Decoding 2019 Alterations™

Let's Talk Nonresidential Indoor Lighting

Unique Room ID: _____ **Room Area (ft²):** _____

Primary Function: _____ (circle or write in)

General Corridor/ Stairs/ Lobby / Copy / Elevator/ Mech/ Laundry/ Locker Industrial: Low Bay 27' High Bay 120' Precision
School Classroom/ Multipurpose 12,000 ft² or 12,000 ft² Auditorium Restaurant/ Fast Food/ Dining/ Casual/ Kitchen
Retail Merchandise/ Grocery/ Filing/ Dry Cleaning/ Mail Theater/ Motion Picture/ Live Video Conferencing
Office 120,000 ft² Open Office/ Conference/ Reception Hospitality: Adult/ Senior/ Family/ Bank Area
Public Library Reading or Study/ Museum Display or Restroom/ Convention/ Civic Hall/ Postal/ Working Transportation: Baggage or Ticketing/ Parking Garage
Healthcare Pharmacy or lab

Recreation Area: 124 ft² (not including Hotel lobby) / Parking: 216 ft²

Yes: Skylight open including Recreation location/ top of window height/ skylight rough opening and floor to skylight height in ft, with window height and area/ Recreation location/ top of window height of room

Primary zone controlled with photosensor(s) **Primary AND secondary zones controlled with photosensor(s)** None

On/Off Control (select one)

- Manual on/off
- Control in room
- Control outside room
- Control inaccessible to unauthorized personnel
- None: Not manual (i.e., controlled at the circuit panel)

Multi-Level Controls (select one)

- None
- Provided: Circle method used (dimmer, A/B lamp/fixture)

Automatic Shut-Off (select one)

- Occupancy sensor
- Vacancy sensor
- Countdown timer _____ min. minutes
- Automatic time-switch (parking building)
- None

General lighting vs. Other Lighting (see column E to document):

- Other Lighting: Specialty lighting (switched separately from general)
- Multi-level Control (circle type) _____ Switched separately

Fixture Name	Count #	Fixture wattage	Dimming/ Alternative lamp/ Alternative fixture	General lighting - Other
			Dimming/ Alternative lamp/ Alternative fixture	General lighting - Other
			Dimming/ Alternative lamp/ Alternative fixture	General lighting - Other
			Dimming/ Alternative lamp/ Alternative fixture	General lighting - Other
			Dimming/ Alternative lamp/ Alternative fixture	General lighting - Other
			Dimming/ Alternative lamp/ Alternative fixture	General lighting - Other
			Dimming/ Alternative lamp/ Alternative fixture	General lighting - Other
			Dimming/ Alternative lamp/ Alternative fixture	General lighting - Other

Project name (auto filled): _____

To support use of Energy Code ACE NR LSG Audit Tool

Logos: SDCS, SoCalGas, Edison, Pacific Gas and Electric

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2019 ENERGY CODE

Interior Lighting - Alterations Nonresidential

2019 ENERGY CODE **Fact Sheet** Nonresidential

Outdoor Lighting Controls (130.2)(6) Requires luminaire cutoff that reduces backlight, uplight and glare (BUG) in alignment with Title 24, Part 11. (130.2)(6) 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. (130.2)(6) Requires outdoor illuminated signs to be controlled with photocell and automatic time-switch, or astronomical time-switch control.

Manual Area Controls (130.1)(4) Each area enclosed by ceiling-height partitions requires lighting controls that manually turn lighting on and off.

Multi-Level Controls (130.1)(4) General lighting to be controlled with multi-level controls (i.e., dimmer) that reduces the lighting power and meets the efficiency requirements of Table 130.1-A.

Shut-Off Controls (130.1)(4) All installed lighting must be shut-off automatically when building or space is not occupied, using building-level control (i.e., time-switch) or space-level control (i.e., occupancy sensor in all spaces). Additionally, room-level controls (i.e., conference rooms required to use a partial ON, or a vacancy sensor, when multi-level controls are required).

Automatic Daylighting Controls (130.1)(4) General lighting, in skylit and primary daylight zones (parking garages additionally include secondary daylight zones), must be automatically adjusted to keep light levels stable throughout the day.

Demand Responsive Controls (130.1)(4) Controls that can reduce indoor building lighting power in response to a Demand Response Signal are required.

Indoor Sign Controls (130.3)(4) All indoor sign lighting, not including illuminated exit signs, must be controlled with an automatic or astronomical time-switch control.

Requirement	Existing LPD	Existing > 90% LPD
Outdoor Lighting	Yes	Yes
Manual Area Controls	Yes	Yes
Multi-Level Controls	Yes	Yes
Shut-Off Controls	Yes	Yes
Automatic Daylighting Controls	Yes	Yes
Demand Responsive Controls	Yes	Yes
Indoor Sign Controls	Yes	Yes

Page 1 of 3
2018-03-21

Energy Code Ace
Happy life for you and life

2019 18c.24, Part 6 - Nonresidential Building Lighting Controls
Page 1 of 10
2018-03-24



Which Code Year Applies? Apply for permit...

Jan. 2020- Dec. 2022

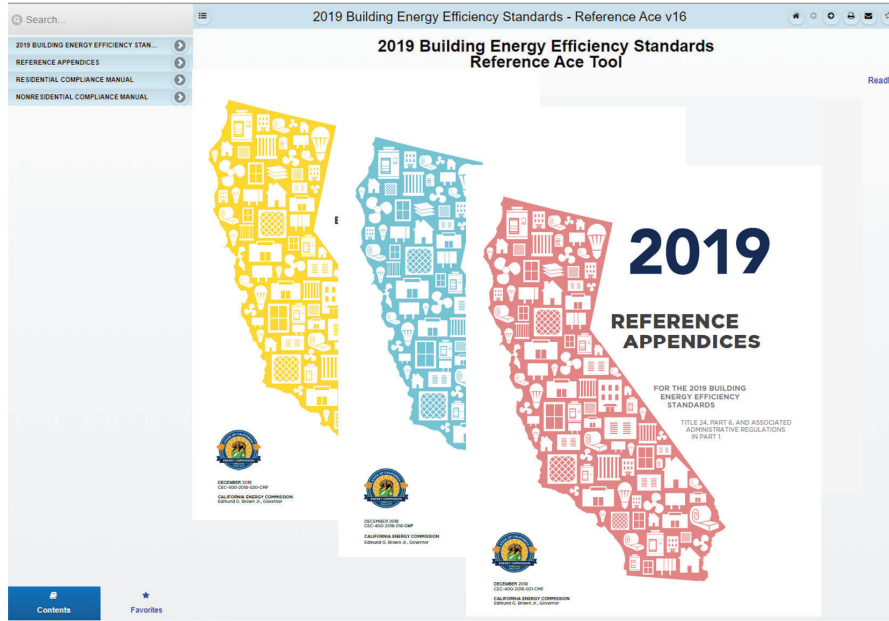
2019

BUILDING ENERGY EFFICIENCY STANDARDS FOR RESIDENTIAL AND NONRESIDENTIAL BUILDINGS

FOR THE 2019 BUILDING ENERGY EFFICIENCY STANDARDS

TITLE 24, PART 6, AND ASSOCIATED ADMINISTRATIVE REGULATIONS IN PART 1.

DECEMBER 2018
CEC-400-2018-020-CHP
CALIFORNIA ENERGY COMMISSION
GUSTAVO S. BROWN, Jr., Governor



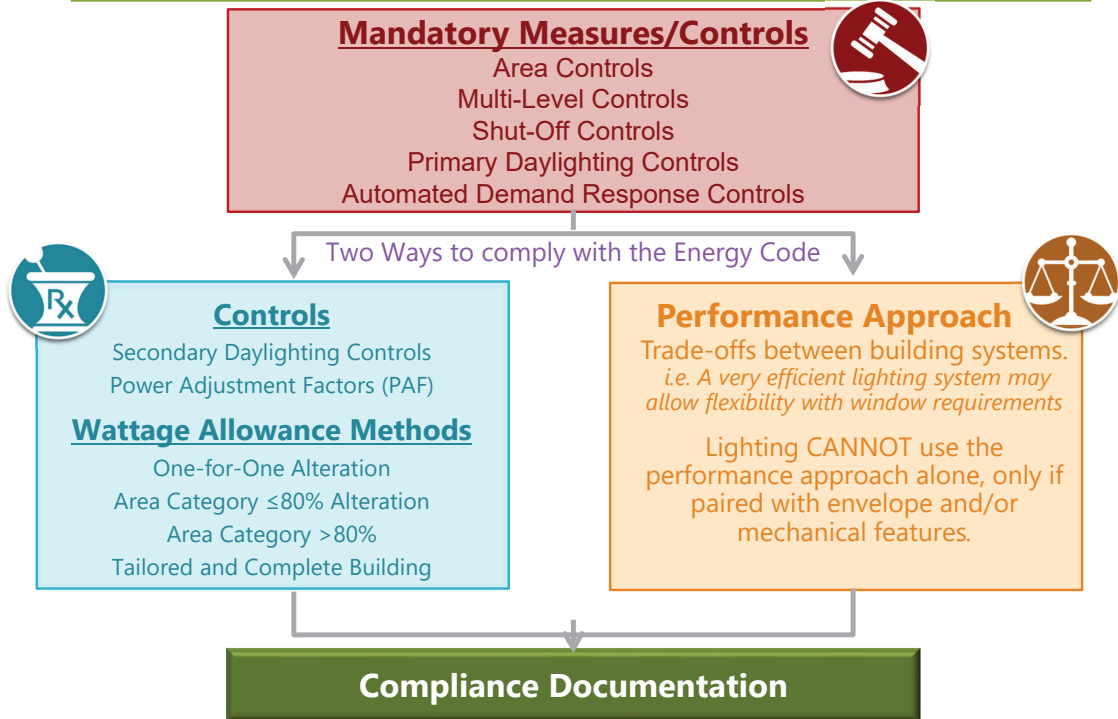
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Defining the Difference



Let's Talk





Challenges



- ✦ Challenge A:
 - ✦ When is Code Triggered?



- ✦ Challenge B:
 - ✦ Tips & Tricks



- ✦ Challenge C:
 - ✦ Compliance Pathways

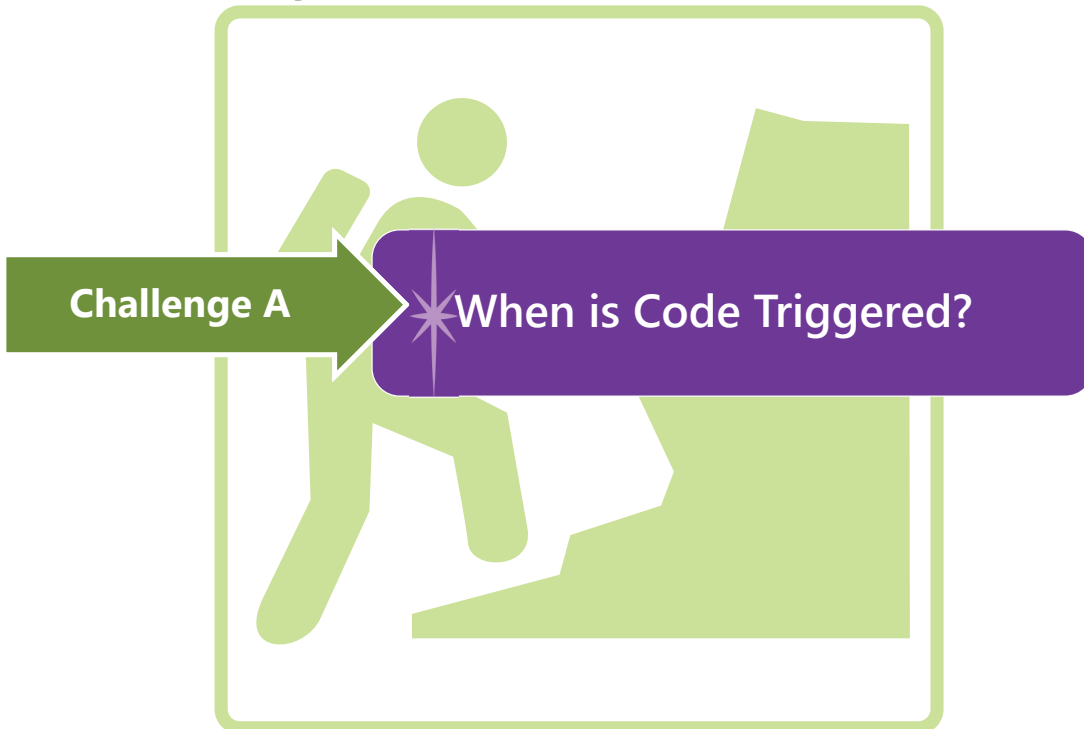


- ✦ Challenge D:
 - ✦ Documenting Compliance

17



Challenge A



18

2019 ENERGY CODE
 Ace Resources
 The 24, Part 6 Triggers
 Nonresidential
Interior Lighting – Alterations

Lighting Alteration Compliance Methods

One-for-One Alteration Method (typically called retrofit projects) (§141.0B(2)(ii)) includes permanently changing the light source, changing the optical system (e.g., reflectors), replacing lamps along with new ballast and/or drivers, and replacing the entire luminaire at the existing location. Limited to buildings and tenant spaces (in multi-tenant buildings) ≤ 5,000 ft² that can show 40% reduction of installed wattage. Energy Code is not triggered when ≤ 50 luminaires per floor or tenant space are altered per year.

Entire Luminaire Alteration Method (§141.0B(2)(i)) includes removing and reinstalling ≥10% of the existing luminaires, replacing and/or removing ≥10% of luminaires in an enclosed space, and redesign of the lighting system. Excludes enclosed spaces with only one luminaire. The Area Category Method (§140.6) is used to determine the maximum wattage allowance per space type, which will dictate lighting control requirements.

Rewiring Alteration (§141.0B(2)) includes replacing or adding lighting circuits, and relocating, modifying or replacing wiring between switch, panels and/or luminaires. Alterations to components of the lighting wiring must meet all applicable requirements in §141.0B(2). For example, relocating an existing area control must meet all applicable requirements in §130.1(a), since they are included in §141.0B(2). These projects will need to meet the manual area control requirements. Separation of general lighting from other types of lighting such as decorative lighting is only required for new or complete replacement of lighting circuits. Existing controls functionality must be maintained, but they may be expanded upon.

When is the Energy Code Triggered? Example Project Scopes

Replacing/upgrading lamp and nothing else being done to the luminaires (considered a repair)	No
Replacing/upgrading <10% of the luminaires in an enclosed space (alteration exception)	No
Replacing/upgrading ≥10% of the lamps and replacing ballast with same ballast type per enclosed space (considered an alteration)	Yes
Upgrading luminaires by adding an LED driver or upgrading the ballast (considered a One-for-One Alteration)	Yes
Removing luminaires and nothing else (not considered an alteration)	No
Removing and upgrading ≥10% luminaires (upgrading ballast and/or adding LED driver) (considered an alteration)	Yes
Upgrading lamp and ballast/driver for an enclosed space with only one luminaire (alteration exception)	No
Adding lighting controls to a space and nothing else (rewiring exception)	No
Adding/replacing lighting circuits (rewire trigger for area control)	Yes
Adding walls and not changing the luminaires (area controls required) (not considered an alteration)	No
Taking down ≥10% of the luminaires, then putting them back up for asbestos abatement (alteration exception)	No
Taking down ≥10% of the luminaires, then putting them back up in same place (i.e., painting the ceiling) (considered an alteration)	Yes
Altering the luminaires while also remodeling the space (i.e., changing or removing walls) (considered an alteration)	Yes
Changing the reflected ceiling plan (relocating and/or adding luminaires) (considered an alteration)	Yes

Lighting Alteration Compliance Method Options: Retrofit (One-for-One Alteration) Project

Project Scope has Triggered Code Determine which compliance method can be used	One for One	Using ≤80% LPD	Using >80% LPD
When project alters >50 luminaires a year in a ≤5,000 ft ² building or in each ≤5,000 ft ² tenant space (or all common areas) in a multi-tenant building while reducing the existing wattage by ≥40% of all altered luminaires combined.	Yes	Yes	Yes
Project limited to: • >50 luminaires altered in a year • >5,000 ft ² building or each >5,000 ft ² tenant space (or all common areas) in a multi-tenant building AND/OR • Reducing the existing wattage by <40% of all altered luminaires combined	No	Yes	Yes
Project is not eligible for the One-for-One Alteration Method but is able to show that post-altered + existing-to-remain luminaire wattage of each room is ≤80% of the wattage allowed per Table 140.6-C (Area Category Method).	No	Yes	Yes
Project is not eligible for the One-for-One Alteration Method but is able to show that post-altered + existing-to-remain luminaire wattage of each room is >80% of the wattage allowed per Table 140.6-C (Area Category Method).	No	No	Yes

If a retrofit project also includes changing the reflected ceiling plan by adding or relocating luminaires, or if rewiring, see Entire Luminaire Alteration Method.

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 2019 Title 24, Part 6 - Nonresidential Interior Lighting - Alterations Triggers
 Page 1 of 3
 2019.11.21



What is a repair versus an alteration?

A Repair Does Not Trigger Code



- ✦ Replacement of lamps, ballasts, or drivers
- ✦ Alterations caused directly by the disturbance of asbestos
- ✦ Alteration limited to adding lighting controls
- ✦ Repairs may not increase energy consumption of repaired equipment
- ✦ Repairs shall not remove existing control functions



What is a repair versus an alteration?

An Alteration Does Trigger Code

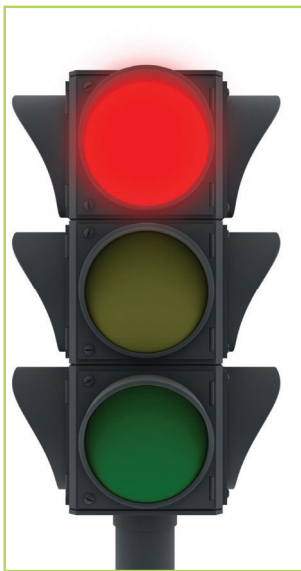


- ✦ Luminaire replacement or rewiring new technology
- ✦ Luminaire relocation
- ✦ New or completely replaced lighting circuits (control separation requirements required)
- ✦ Replacing ballast AND lamp at the same time even if with the same technology

21



Projects that do not trigger code



Replacing Lamps

- ✦ Changing out incandescent screw base lamps with LED screw base lamps
- ✦ Changing out fluorescent T-8's with TLED's
- ✦ Adding lights to an existing track system
- ✦ Replacing lighting/lamps in refrigerated spaces <math>< 3,000 \text{ ft}^2</math> (this is covered under Title 20, not Title 24)

22



Projects that DO trigger code



120.6(b)3. Refrigerated Display Cases.

Lighting in refrigerated display cases, and lights on glass doors installed on walk-in coolers and freezers shall be controlled by one of the following:

- A. Automatic time switch controls to turn off lights during nonbusiness hours. Timed overrides for any line-up or walk-in case may only be used to turn the lights on for up to one hour. Manual overrides shall time-out automatically to turn the lights off after one hour.
- B. Motion sensor controls on each case that reduce display case lighting power by at least 50 percent within 30 minutes after the area near the case is vacated.

✦ Replacing luminaire in refrigerated cases is a covered process trigger §120.6(b)3 and would not be included in indoor lighting compliance paperwork.

23



Challenge B

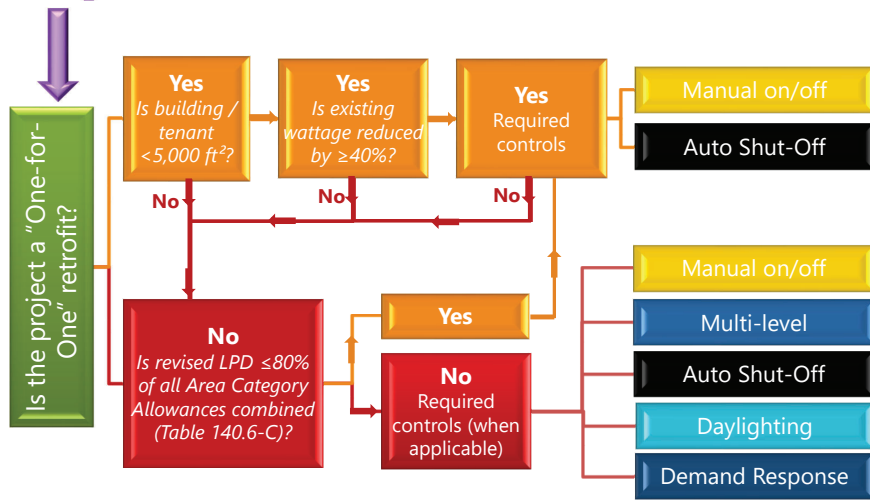


24



Compliance Triage

Step 1

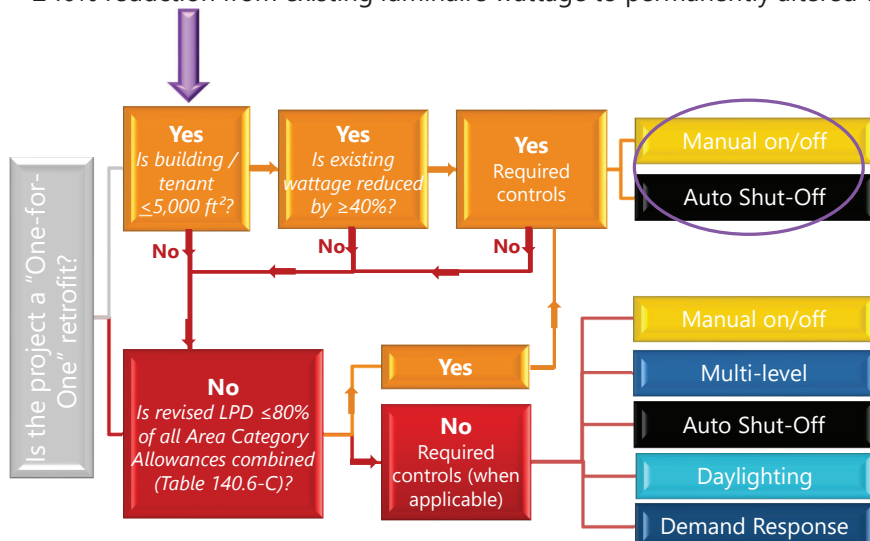


Alteration Compliance Pathways

One-for-One Alteration

Requirements:

- ◇ > 50 luminaires altered per floor, or tenant, in a year
- ◇ $\leq 5,000$ ft² building, or tenant space
- ◇ $\geq 40\%$ reduction from existing luminaire wattage to permanently altered wattage



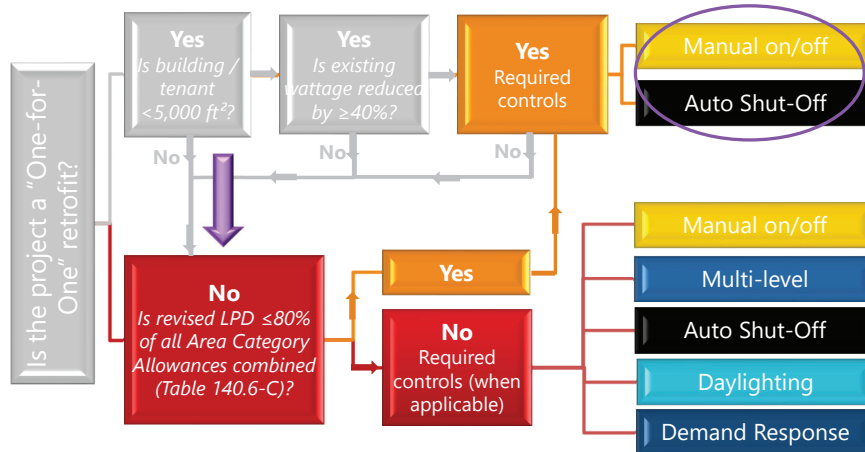


Alteration Compliance Pathways

≤80% Area Category Alteration

Requirements:

- ≥10% luminaires altered in a space
- ≥2 luminaires in the space
- Altered lighting power density is 80% or less of the allowed wattage per Table 140.6-C



27

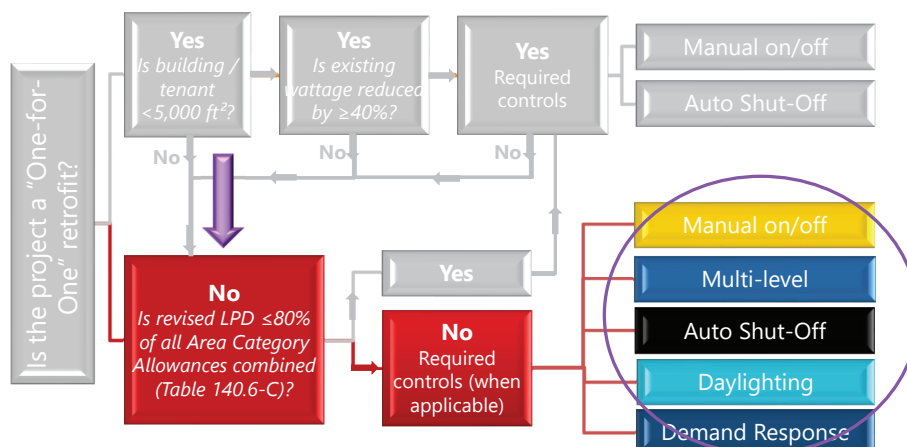


Alteration Compliance Pathways

>80% but ≤100% Area Category Alteration

Requirements:

- ≥10% luminaires altered in a space
- ≥2 luminaires in the space
- Altered lighting power density is more than 80% of the allowed wattage per Table 140.6-C, but does not exceed LPD allowance.



28



Alteration Compliance Pathways

Complete Building or Tailored Method

★ Requirements:

- ✧ ≥10% luminaires altered in a space
- ✧ ≥2 luminaires in the space
- ✧ Complete Building must be used for entire building of which is 90% is one use type
- ✧ Tailored allows for layers of lighting such as wall display, floor display, etc.



29

Mandatory Controls		Entire Luminaire Alteration Method		One-for-One Component Method
<i>Reqs Based on Lighting Alteration Compliance Method Used</i>		<i>Excluding spaces with only 1 luminaire</i>		
Acceptance testing requirements of §130.4 are not required for Alterations where lighting controls are added/alterated to control ≤ 20 luminaires for the entire permitted project (both indoor, outdoor and sign lighting)		Using > 80% of allowed LPD	Using ≤ 80% of allowed LPD	Total Wattage Reduced ≥ 40% (limited to 5,000 ft ²)
Manual Area Controls (on/off): §130.1(a)1,2,3 For each enclosed space • Excluding >0.2 W/ft ² egress lighting		Yes	Yes	Yes
		Separate switching for "general" versus "other" not required for shared circuits		
Multi-level Control: §130.1(b) • Enclosed spaces ≥100 ft ² and • Connected lighting load >0.5 W/ft ² • Excluding restrooms • Excluding healthcare facilities		Yes <i>Only for modified luminaires</i>	No	No
Auto Shut-Off Control: §130.1(c)1-8 Excluding Healthcare Facilities		Whole Bldg. Shut-Off (i.e. time clock or time-switch control): §130.1(c)1-4		
		Yes	Yes	Yes
		Separate controls for "general" versus "other" not required for shared circuits		
		Yes	Yes	Yes
		In offices ≤250 ft ² , multipurpose rooms <1,000 ft ² , and classrooms/conference rooms/restrooms of any size		
		Yes	Yes	Yes
Primary Daylight Control: §130.1(d) • Triggered by ≥ 120 Watts in primary/skylit zone(s) (parking garage ≥ 60 Watts) and • ≥ 24 ft ² fenestration (parking garage ≥ 36 ft ²) • Excluding areas shaded per exception 1 and 2 • Excluding retail merchandise sales/wholesale showroom sidelit zones		Yes	No	No
Demand Response: §110.12(c) • Permitted area > 10,000 ft ² • Excluding spaces ≤ 0.5 W/ft ² • Excluding where health and safety do not permit reduced lighting		Yes	No	No





Alteration Triggers



130.1(a)

★ **Area Controls:** Each area shall provide easily accessible lighting controls that allow the lighting in that area to be manually turned on and off

✧ Exceptions for egress lighting; control accessibility and location for specific applications may apply



- ★ Separately Control:
 - ✧ General lighting from
 - ✧ Display, ornamental, track and special effects lighting

★ Alteration Exception

Separate switching for "general" versus "other" not required for shared circuits

- >80% Area Category Method
- ≤80% Area Category Method
- One-for-One Method



Alteration Triggers



130.1(b)

★ **Multi-Level Controls:** Lighting controls that allow the level of lighting to be adjusted up and down per Table 130.1

✧ Not including Restrooms /Healthcare

Luminaire Type	Minimum Required Control Steps			
Line-voltage sockets except GU-24 Low-voltage incandescent systems LED luminaires and LED source systems GU-24 rated for LED	Continuous dimming 10-100%			
GU-24 sockets rated for fluorescent > 20 W Pin-based compact fluorescent > 20 W	Continuous dimming 20-100%			
GU-24 sockets rated for fluorescent ≤ 20 W Pin-based compact fluorescent ≤ 20 W Linear/U-bent fluorescent ≤ 13 W	Minimum one step between 30-70% <i>Using: Stepped dimming; or Continuous dimming; or Switching alternate lamps in a luminaire</i>			
Linear/U-bent fluorescent > 13 W	Minimum one step in each range:			
	<table border="1"> <tr> <td>20-40%</td> <td>50-70%</td> <td>75-85%</td> <td>100%</td> </tr> </table>	20-40%	50-70%	75-85%
20-40%	50-70%	75-85%	100%	
	<i>Using: 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</i>			
Track Lighting	Minimum one step between 30 – 70% <i>Using: Step dimming; or Continuous dimming; or Separately switching circuits in multi-circuit track with a minimum of two circuits.</i>			
HID > 20 W Induction > 25 W Other light sources	Minimum one step between 50 – 70% <i>Using: 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.</i>			

- ★ Enclosed space:
 - ✧ ≥100 ft²;
 - ✧ Connected general lighting load >0.5 W/ft²;
 - ✧ >1 luminaire or 1 luminaire with ≥3 lamps

★ Alteration Exception(s)

- >80% Area Category Method
- ≤80% Area Category Method
- One-for-One Method



Alteration Triggers



★ **Shut-off Controls:** Automatically reduce lighting power when the space is typically unoccupied
 ✦ Not including healthcare



- ★ Alteration Exception(s)
 - >80% Area Category Method
 - ≤80% Area Category Method
 - One-for-One Method



Alteration Triggers



Off at End of Workday	
Code Section	§130.1(c)1-4
Desired Result	No one working in the building anymore, lights should be off.
Code Requirement	Everything in building turns off except 0.1 w/ft ² of designed egress lighting
Applicable to	Exception for 24/hour 7-day facilities
Control Options	<input type="checkbox"/> Timeclock serving entire/part of building <input type="checkbox"/> Occupancy sensors where timeclock not used

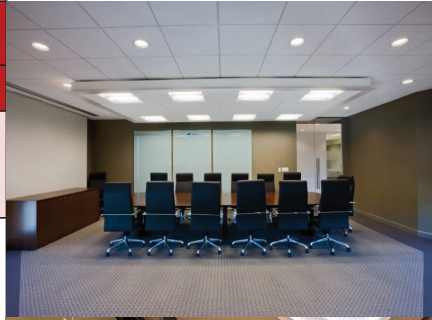




Alteration Triggers



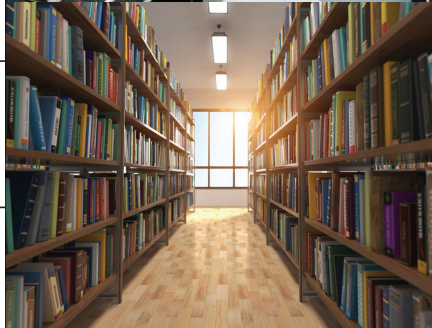
During Workday, Off When Vacant	
Code Section	§130.1(c)5
Desired Result	Space not occupied during workday; lights should be off when no one there.
Code Requirement	<i>Everything in room turns off except 0.2 w/ft² of designed egress lighting</i>
Applicable to	<ul style="list-style-type: none"> Offices ≤250 ft² Multipurpose room <1000 ft² Classrooms Conference room Restrooms
Control Options	<input type="checkbox"/> Occupancy sensor only allowed when multilevel controls are not required <input type="checkbox"/> Partial-On or vacancy sensor can allow be used



Alteration Triggers



During Workday, Partial-Off. Off After Hours	
Code Section	§130.1(c)6
Desired Result	Space not occupied during workday but turning off all the lighting would be a bad idea.
Code Requirement	<i>Lighting reduces by at least 50% when no one there, goes up to 100% when someone is there. At end of workday, lighting turns off 100% when no one is there.</i>
Applicable to	<ul style="list-style-type: none"> Stairwells / Corridors Aisle ways and open areas in warehouses Library book stack aisles ≥10 ft
Control Options	<input type="checkbox"/> Timeclock for end of workday <input type="checkbox"/> Occupancy sensor programed as partial-Off during workday

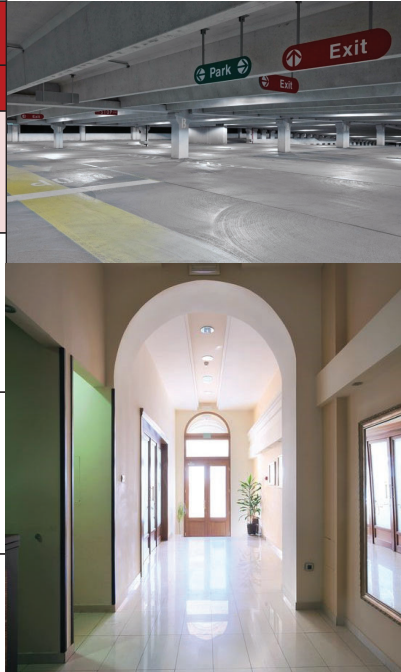




Alteration Triggers



24 Hour Space, Partial-Off	
Code Section	\$130.1(c)7
Desired Result	Space not occupied but turning off all the lighting would be a bad idea and the building is occupied 24 hours a day/7 days a week
Code Requirement	Lighting reduces by at least 50% when no one there, goes up to 100% when someone is there.
Applicable to	<ul style="list-style-type: none"> Common area stairwells/corridors in multifamily and hotel/motel buildings Parking garages
Control Options	<input type="checkbox"/> Occupancy Sensors programed as partial-off

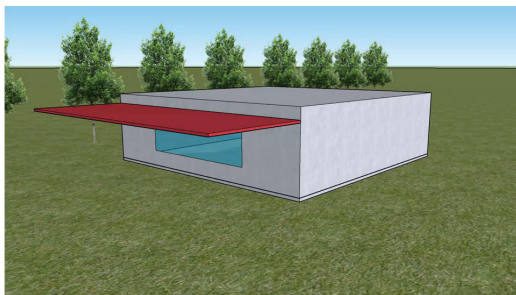


Alteration Triggers (cont.)



✦ **Automatic Daylighting Controls:** Adjust the power of the installed lighting up and down to keep the total light level stable as the amount of incoming daylight changes

✧ Not including Healthcare



New 2019 Exceptions:

- ✦ Skylights: If daylight blocked > 1,500 daytime hours
- ✦ Sidelit: Overhang ratio in which daylight rarely hits window
- ✦ Sidelit: Retail merchandise sales and wholesale showroom areas.

- ✦ Enclosed space with (parking garage has different triggers):
 - ✧ ≥24 ft² of glazing, and
 - ✧ ≥ 120 watts of general lighting in all skylit and primary sidelit daylight zones

✦ Alteration Exception(s)

- >80% Area Category Method
- ≤80% Area Category Method
- One-for-One Method

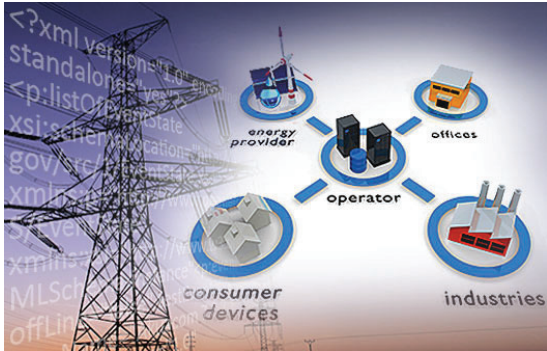


Alteration Triggers (cont.)



130.1(e)

✦ **Automated Demand Response:** reducing lighting power in response to a Demand Response Signal



<https://drrc.lbl.gov/openadr>

- ✦ Building or altered projects with:
 - ✧ >10,000 ft² including spaces with
 - ✧ >0.5 W/ft² of general lighting
 - ✧ Excluding wattage associated with lighting not permitted by a health or life safety statute, ordinance, or regulation to be reduced

✦ **Alteration Exception(s)**

- >80% Area Category Method
- ≤80% Area Category Method
- One-for-One Method



Challenge C

Challenge C

✦ Tips & Tricks



Lighting Alteration Documentation

Lighting Audit

- ✦ Required for all compliance methods
- ✦ Make sure you audit ALL required lighting system features

Reflected Ceiling Plan

- ✦ Required by most AHJ's to confirm area category space types and square footage
- ✦ Not typically required for One-for-One method, confirm with local AHJ

NRCC-LTI-E

- ✦ Required for all compliance methods (including cutsheets of all lighting luminaires and controls)
- ✦ Alternative option using NRCC-PRF-01-E but only if other building features being altered

NRCI and NRCA

- ✦ Required for all compliance methods
- ✦ NRCA: Exception for projects where controls added to 20 or less luminaires for entire project (indoors and outdoors).



Triage

Is multilevel technology desired?

Is there concern that daylighting controls might be required?

Is there concern that demand response might be required?

One-for-One

Benefit:

- Multilevel, daylighting and demand response controls not required
- Reflected ceiling plans might not be required, but highly recommended

≤80% Area Category

Benefit:

- Multilevel, daylighting and demand response controls not required

>80% Area Category

Benefit:

- More wattage allowed



Reflected Ceiling Plans



What needs to be included?

- ✦ Room use type (i.e. office versus corridor)
- ✦ Square footage
- ✦ Existing lighting (lighting schedule to provide before and after luminaire support)
- ✦ Altered lighting plan if reflected ceiling plan will change
- ✦ Windows, glass doors, and skylights
- ✦ Existing lighting controls is a bonus! Make sure to include all new controls to be installed as part of the project.

43



Lighting Controls



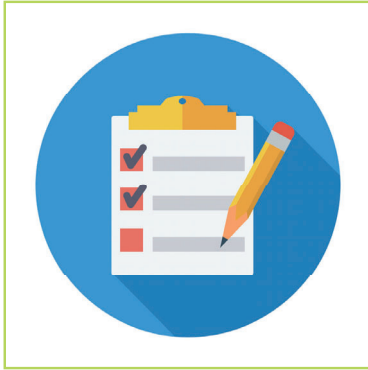
What controls are there already?

- ✦ Many times, new controls may not be required, but unless you know what you have, you don't know what you might need.
 - ◇ Manual on/off controls
 - ◇ Dimmers
 - ◇ Occupancy Sensors
 - ◇ Timeclocks/EMCS/BMS
 - ◇ Daylighting controls
 - ◇ Demand response

44



Lighting Controls – Alternatives

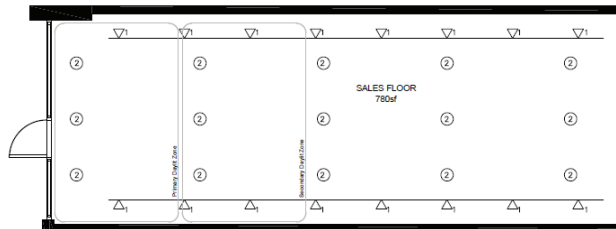


When is there “flexibility” to the control requirements?

- ✦ The Energy Code has built in some flexibility for certain space types in meeting the mandatory requirements:
 - ✦ Manual on/off controls: Sometimes they can be locked up, or not in the room
 - ✦ Occupancy Sensors: Certain space types have specific occupancy sensor programming requirements (i.e. partial-on)
 - ✦ Timeclocks/EMCS/BMS: Some space types are exempt from certain programming requirements (i.e. holiday scheduling)
 - ✦ Daylighting controls: Some space types are exempt to sidelit requirements



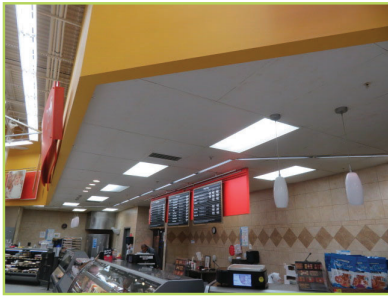
Lighting Audit



Unique Room ID: Sales Floor		Room Area (ft²): 780		
Primary Function: _____ (circle or write in)				
General: Corridor/ Stairs/ Lobby / Copy / Elect/ Mech/ Laundry/ Locker School: Classroom/ Multipurpose ≥1,000 ft ² or <1,000 ft ² / Auditorium Retail (Merchandise): Grocery/ Fitting Rm/ Concourse/ Mall Office: <250 ft ² / >250 ft ² / Open Office/ Conference/ Breakroom Public: Library Reading or Stack/ Museum Display or Restore/ Convention/ Civic Mtg/ Hotel/ Worship		Industrial: Low Bay 25'/ High Bay ≥25'/ Precision Restaurant: Fast Food/ Dining Leisure/ Kitchen Theater: Motion Picture/ Live/ Video Conferencing Specialized: Auto Repair/ Beauty Salon/ Bank Area Transportation: Baggage or Ticketing or Parking Garage		
Storage: Warehouse/ Shipping Sports: Sports Arena/ Exercise Area Bathroom: Single Stall or Multi Stall Healthcare: Pharmacy or Lab or _____		Healthcare: Pharmacy or Lab or _____		
Fenestration Area: ≥24 ft ² (not including Retail sidelit) / Parking: ≥36 ft ² <input checked="" type="checkbox"/> Yes Sketch out room including fenestration location/top of window height/Skylight rough opening and floor to skylight height in ft, and which fixtures are near fenestration) overhangs on back side of paper <input type="checkbox"/> Primary zone controlled with photosensor(s) <input type="checkbox"/> Primary AND secondary zones controlled with photosensor(s) <input checked="" type="checkbox"/> None				
On/Off Controls (select one) <input type="checkbox"/> Manual on-off: <input type="checkbox"/> Control in room <input type="checkbox"/> Control outside room <input type="checkbox"/> Control inaccessible to unauthorized personnel <input type="checkbox"/> None: Not manual (i.e. controlled at the circuit panel)		Automatic Shut-Off (select one) <input type="checkbox"/> Occupancy sensor <input type="checkbox"/> Partial-on occupancy sensor <input type="checkbox"/> Vacancy sensor <input type="checkbox"/> Partial-off occupancy sensor <input type="checkbox"/> Countdown timer _____ max. minutes <input type="checkbox"/> Automatic time-switch (serving building) <input checked="" type="checkbox"/> None		
Multi-Level Controls (select one) <input type="checkbox"/> Provided: Circle method used (dimmer, A/B lamp/fixture) <input checked="" type="checkbox"/> None		General lighting vs. Other lighting Use column E to document: • General Lighting: Ambient lighting • Other Lighting: Specialty lgt switched separately from general		
(E)Fixture Name	Count #	(E)Fixture wattage	Multi-level Control (circle type)	Switched Separately
Can light	15	100 W	Dimming/ Alternate lamp/ Alternate fixture	<input checked="" type="checkbox"/> General lgt <input type="checkbox"/> Other
Track lights	16	80 W ea	Dimming/ Alternate lamp/ Alternate fixture	<input type="checkbox"/> General lgt <input checked="" type="checkbox"/> Other
			Dimming/ Alternate lamp/ Alternate fixture	<input type="checkbox"/> General lgt <input type="checkbox"/> Other
			Dimming/ Alternate lamp/ Alternate fixture	<input type="checkbox"/> General lgt <input type="checkbox"/> Other
			Dimming/ Alternate lamp/ Alternate fixture	<input type="checkbox"/> General lgt <input type="checkbox"/> Other
			Dimming/ Alternate lamp/ Alternate fixture	<input type="checkbox"/> General lgt <input type="checkbox"/> Other



Luminaire Specifications



Will dimmability be required?

- ✦ If multilevel is required, luminaires will need to meet control requirements of Table 130.1-A

Table 130.1-A				
Luminaire Type	Minimum Required Control Steps			
Line-voltage sockets except GU-24 Low-voltage incandescent systems LED luminaires and LED source systems GU-24 rated for LED	Continuous dimming 10-10%			
GU-24 sockets rated for fluorescent > 20 W Pin-based compact fluorescent > 20 W	Continuous dimming 20-10%			
GU-24 sockets rated for fluorescent ≤ 20 W Pin-based compact fluorescent ≤ 20 W Linear/U-bent fluorescent ≤ 13 W	Minimum one step between 30-70% <i>Using: Stepped dimming; or Continuous dimming; or Switching alternate lamps in a luminaire</i>			
Linear/U-bent fluorescent > 13 W	Minimum one step in each range:			
	20-40%	50-70%	75-85%	100%
	<i>Using: 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.</i>			
Track Lighting	Minimum one step between 30 – 70% <i>Using: Step dimming; or Continuous dimming; or Separately switching circuits in multi-circuit track with a minimum of two circuits.</i>			
HID > 20 W Induction > 25 W Other light sources	Minimum one step between 50 – 70% <i>Using: 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.</i>			

47



Changing Specifications

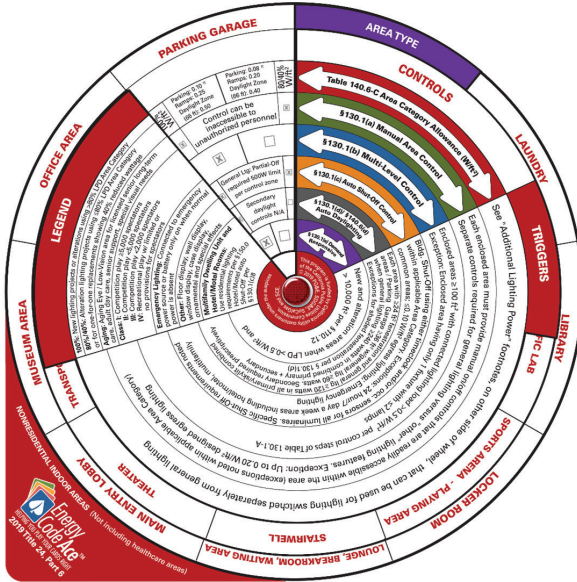


When would alternate fixtures be a good idea?

- ✦ Will reducing the wattage of luminaire allow different compliance method to work that doesn't require the lighting controls the client does want?
- ✦ If multilevel is required, can the luminaires dim per Table 130.1-A?

Table 130.1-A	
Luminaire Type	Minimum Required Control Steps
Line-voltage sockets except GU-24 Low-voltage incandescent systems LED luminaires and LED source systems GU-24 rated for LED	Continuous dimming 10-100%

48



How to order!

- ✦ Order up to 5 wheels free of charge by emailing info@EnergyCodeAce.com
- ✦ Include your name and shipping address.



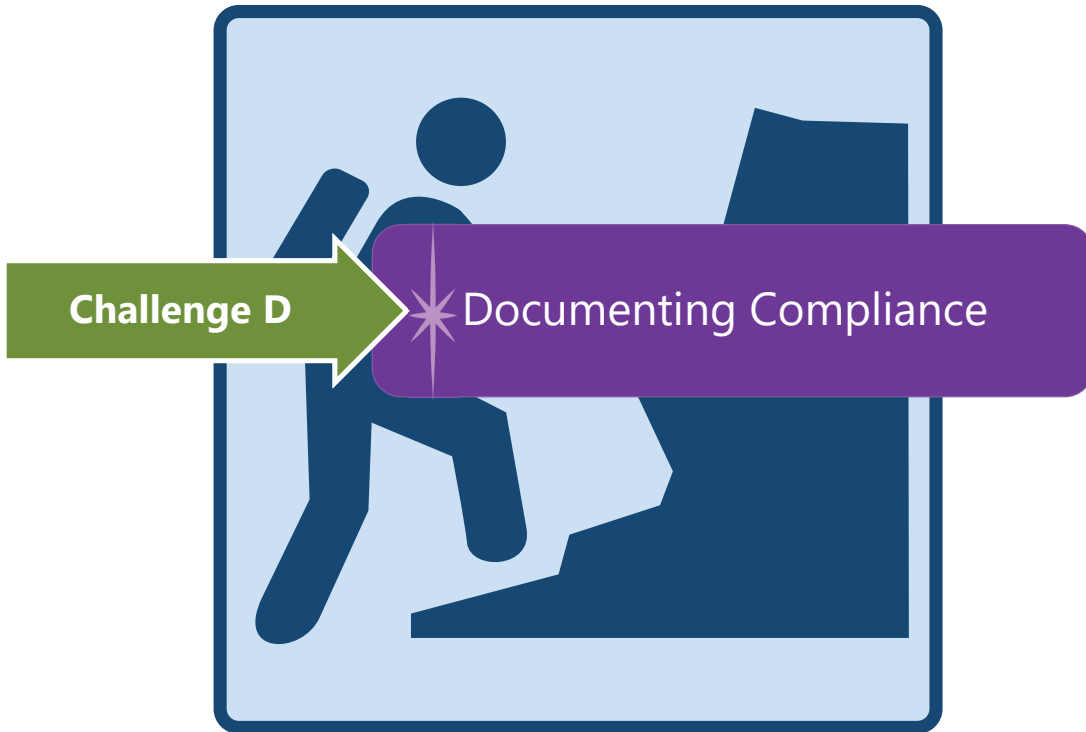
Play Along!

<https://fortech.net/lightingwheeldemo/html5/>





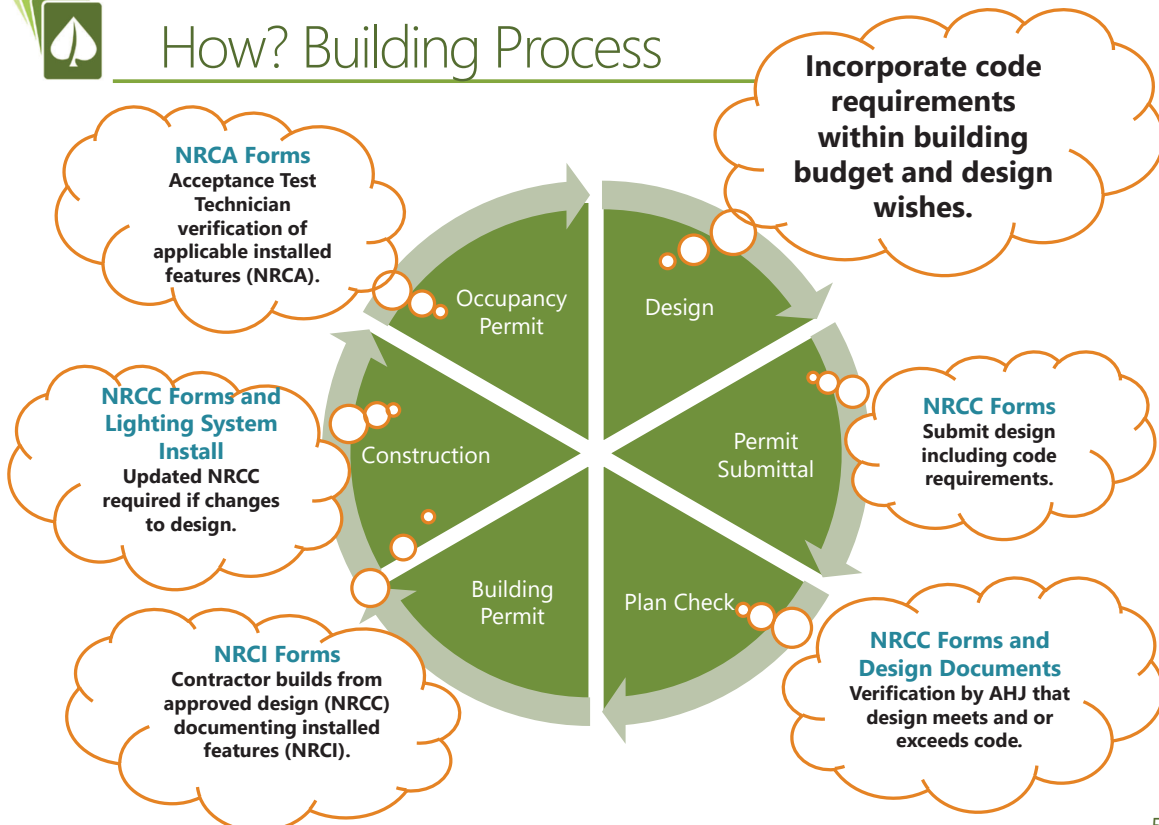
Challenge D



51



How? Building Process

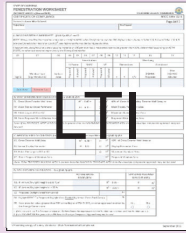


52

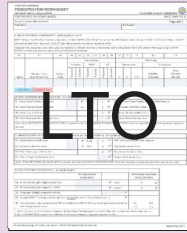


Mandatory & Prescriptive NRCCs

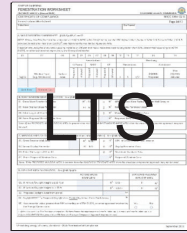
Certificate of Compliance



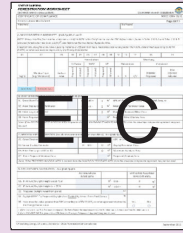
LTI



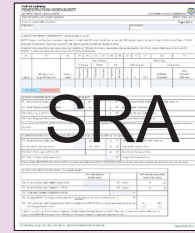
LTO



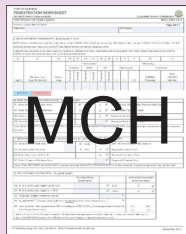
LTS



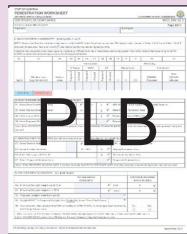
ELC



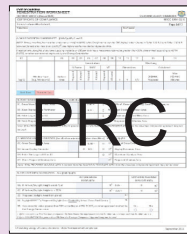
SRA



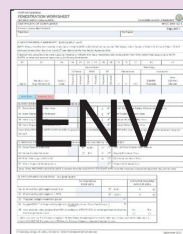
MCH



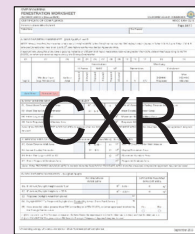
PLB



PRC



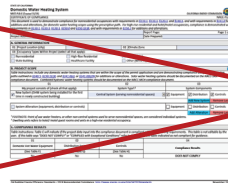
ENV



CXR



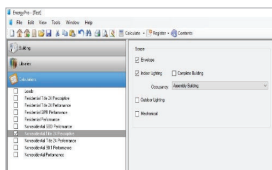
Where to get the NRCC



~~energy.ca.gov/title24/2019standards/2019_compliance_documents/Nonresidential_Documents/~~



energycodeace.com/content/tools-ace/tool=forms-ace

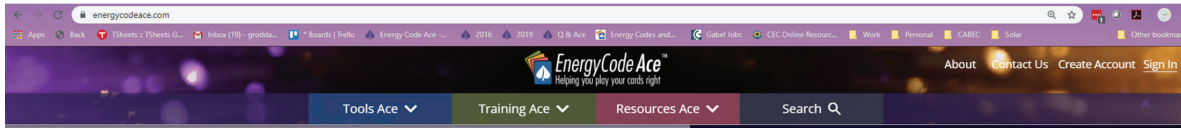


Via EnergyPro Software
energysoft.com/energypro/nonresidential-modules/



Energy Code Ace (Free)

<https://energycodeace.com>



* Nonresidential Compliance Documents

Official California Energy Commission compliance documents can be found below.

Complete 2019 Forms

Please download and save the form to your computer. Then use Adobe Acrobat Reader 2017 (free) to complete the dynamic pdfs and submit to the Authority Having Jurisdiction.

[NRCC Forms](#) ^

[NRCI Forms](#) ^

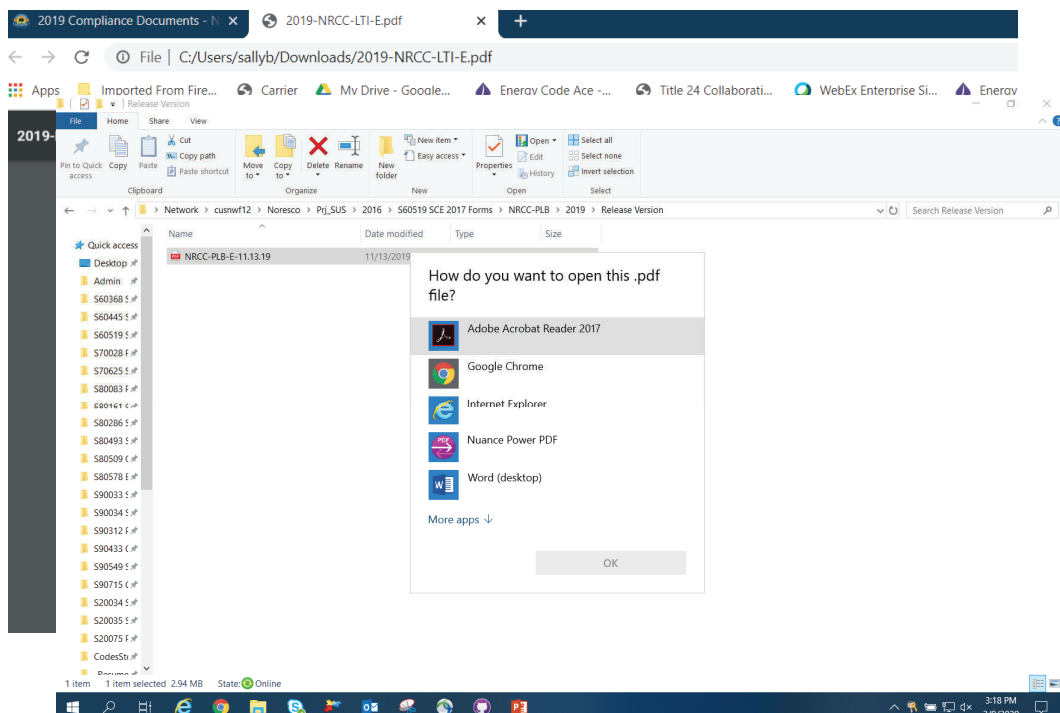
[NRCA Forms](#) ^

[NRCV Forms](#) ^

^ Hide Forms



Downloading & Opening





Applying for Permit: NRCC

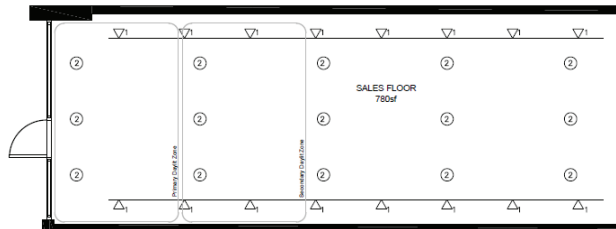
Certificate of Compliance



- ✦ Provided with plans or equipment schedule; submitted to building department for permit
- ✦ Reviewed by counter tech or plans examiner



Lighting Audit – Let's Use It!



Unique Room ID: Sales Floor		Room Area (ft²): 780		
Primary Function: _____ (circle or write in)				
General: Corridor/ Stairs/ Lobby / Copy / Elect/ Mech/ Laundry/ Locker School: Classroom/ Multipurpose $\geq 1,000$ ft ² or $< 1,000$ ft ² / Auditorium Retail (Merchandise): Grocery/ Fitting Rm/ Concourse/ Mall Office: ≥ 350 ft ² / > 350 ft ² / Open Office/ Conference/ Breakroom Public: Library Reading or Stack/ Museum Display or Restore/ Convention/ Civic Mtg/ Hotel/ Worship		Industrial: Low Bay 25' / High Bay $\geq 25'$ / Precision Restaurant: Fast Food/ Dining Leisure/ Kitchen Theater: Motion Picture/ Live/ Video Conferencing Specialized: Auto Repair/ Beauty Salon/ Bank Area Storage: Warehouse/ Shipping Sports: Sports Arena/ Exercise Area Bathrooms: Single Stall or Multi Stall Healthcare: Pharmacy or Lab or Transportation: Baggage or Ticketing or Parking Garage		
Fenestration Area: ≥ 24 ft ² (not including Retail sidelit) / Parking: ≥ 36 ft ² <input checked="" type="checkbox"/> Yes Sketch out room including fenestration location/top of window height/Skylight rough opening and floor to skylight height in ft, and which fixtures are near fenestration) overhangs on back side of paper <input type="checkbox"/> Primary zone controlled with photosensor(s) <input type="checkbox"/> Primary AND secondary zones controlled with photosensor(s) <input checked="" type="checkbox"/> None				
On/Off Controls (select one) <input type="checkbox"/> Manual on-off: <input type="checkbox"/> Control in room <input type="checkbox"/> Control outside room <input type="checkbox"/> Control inaccessible to unauthorized personnel <input type="checkbox"/> None: Not manual (i.e. controlled at the circuit panel)		Automatic Shut-Off (select one) <input type="checkbox"/> Occupancy sensor <input type="checkbox"/> Partial-on occupancy sensor <input type="checkbox"/> Vacancy sensor <input type="checkbox"/> Partial-off occupancy sensor <input type="checkbox"/> Countdown timer _____ max. minutes <input type="checkbox"/> Automatic time-switch (serving building) <input checked="" type="checkbox"/> None		
Multi-Level Controls (select one) <input type="checkbox"/> Provided: Circle method used (dimmer, A/B lamp/fixture) <input checked="" type="checkbox"/> None		General lighting vs. Other lighting Use column E to document: <input checked="" type="checkbox"/> General Lighting: Ambient lighting <input type="checkbox"/> Other Lighting: Specialty lgt switched separately from general		
(E)Fixture Name	Count #	(E)Fixture wattage	Multi-level Control (circle type)	Switched Separately
Can light	15	100 W	Dimming/ Alternate lamp/ Alternate fixture	<input checked="" type="checkbox"/> General lgt <input type="checkbox"/> Other
Track lights	16	80 W ea	Dimming/ Alternate lamp/ Alternate fixture	<input type="checkbox"/> General lgt <input checked="" type="checkbox"/> Other
			Dimming/ Alternate lamp/ Alternate fixture	<input type="checkbox"/> General lgt <input type="checkbox"/> Other
			Dimming/ Alternate lamp/ Alternate fixture	<input type="checkbox"/> General lgt <input type="checkbox"/> Other
			Dimming/ Alternate lamp/ Alternate fixture	<input type="checkbox"/> General lgt <input type="checkbox"/> Other
			Dimming/ Alternate lamp/ Alternate fixture	<input type="checkbox"/> General lgt <input type="checkbox"/> Other



One-for-One Method Example

Room	Light Tag	Description	(E) Light Wattage	(E) # of lights	(A) Light Wattage	(A) # of lights	Existing Lighting Controls			
							Manual on/off	Multi-level	Shut-Off	Day Lighting
Retail 780 ft ²	1	Wall Display	80 W Halogen screw in	16	25 W LED Screw in	16	Separate from cans	none	timeclock	none
	2	Can (general)	Incandescent 100 W ea	15	LED driver 45 ea	15	back rm	none	timeclock	none

✦ Is it a retrofit project?
Yes

✦ Does it exceed 5,000 ft²?
No, which allows the One-for-One method to be used

✦ Has existing wattage been reduced by 40%?
Yes Existing: #1-----#2(15x100)= 1,500 W
Altered: #1----- #2(15x45)= 675 W 55% reduction

✦ Will any new lighting controls be required?
No One-for-One doesn't require multilevel, and all other existing controls meet minimum requirements.



NRCC-LTI-E: One-for-One Method

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: Example Report Page: Page 1 of 6
Project Address: Alteration Date Prepared: 2/23/2020

A. GENERAL INFORMATION

01 Project Location (city)	Example	04 Total Conditioned Floor Area (ft ²)	780
02 Climate Zone	3	05 Total Unconditioned Floor Area (ft ²)	0
03 Occupancy Types Within Project (select all that apply):		06 # of Stories (Habitable Above Grade)	1

Office Retail Warehouse Hotel/Motel School Support Areas
 Parking Garage High-Rise Residential Relocatable Healthcare 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
Calculation Method	Area (ft ²)	Calculation Method	Area (ft ²)	
<input type="checkbox"/> New Lighting System				
<input checked="" type="checkbox"/> Altered Lighting System	Add Parking Garage-Complete Bldg Method	780	Remove Parking Garage	0
	Rated Power Reduction			
	Add Altered Lighting System		Remove Last Altered System	
Total Area of Work (ft²)	780		0	

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 (+)	Total Allowed (Watts)	Total Designed (Watts)	Adjustments PAF Control Credits §140.6(a)2 (-)	Total Adjusted (Watts) *Includes Adjustments	05 Must be ≥ 08 §140.6
	(See Table I)	(See Table I)	(See Table J)	(See Table K)		(See Table F)	(See Table P)		
Conditioned:					≥				
Unconditioned:					≥				

Table Continued

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



NRCC-LTI-E: One-for-One Method

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

CALIFORNIA ENERGY COMMISSION
NRCC-LTI-E

CERTIFICATE OF COMPLIANCE
Project Name: Example Report Page: Page 2 of 6
Project Address: Alteration Date Prepared: 2/23/2020

Controls Compliance (See Table H for Details)		COMPLIES
Rated Power Reduction Compliance (See Table Q for Details)		COMPLIES

D. EXCEPTIONAL CONDITIONS
This table is auto-filled with uneditable comments because of selections made or data entered in tables throughout the form.
Selections made in Table U have been changed by the permit applicant. See Table E, Additional Remarks for permit applicant's explanation.

E. ADDITIONAL REMARKS
This table includes remarks made by the permit applicant to the Authority Having Jurisdiction.
Track lighting not included since track system is not being changed, only the track fixtures, hence no permanent reduction of installed wattage. ATT acceptance testing not required since less than 20 controlled fixtures being altered.

F. INDOOR LIGHTING FIXTURE SCHEDULE
This Section Does Not Apply

G. MODULAR LIGHTING SYSTEMS
This Section Does Not Apply

H. INDOOR LIGHTING CONTROLS (Not Including PAFs)
This Section Does Not Apply

I. LIGHTING POWER ALLOWANCE: COMPLETE BUILDING OR AREA CATEGORY METHODS
This Section Does Not Apply

J. ADDITIONAL LIGHTING ALLOWANCE: AREA CATEGORY METHOD QUALIFYING LIGHTING SYSTEM
This Section Does Not Apply

K. TAILORED METHOD GENERAL LIGHTING POWER ALLOWANCE
This Section Does Not Apply

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

61



NRCC-LTI-E: One-for-One Method

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

CALIFORNIA ENERGY COMMISSION
NRCC-LTI-E

CERTIFICATE OF COMPLIANCE
Project Name: Example Report Page: Page 3 of 6
Project Address: Alteration Date Prepared: 2/23/2020

L. ADDITIONAL LIGHTING ALLOWANCE: TAILORED WALL DISPLAY
This Section Does Not Apply

M. ADDITIONAL LIGHTING ALLOWANCE: TAILORED FLOOR AND TASK LIGHTING
This Section Does Not Apply

N. ADDITIONAL LIGHTING ALLOWANCE: TAILORED ORNAMENTAL/SPECIAL EFFECTS
This Section Does Not Apply

O. ADDITIONAL LIGHTING ALLOWANCE: TAILORED VERY VALUABLE MERCHANDISE
This Section Does Not Apply

P. POWER ADJUSTMENT: LIGHTING CONTROL CREDIT (POWER ADJUSTMENT FACTOR (PAF))
This Section Does Not Apply

Q. RATED POWER REDUCTION COMPLIANCE FOR ALTERATIONS

*Table Instructions: Complete this table for indoor lighting alterations complying prescriptively with §141.0(b)2(iii). Any control options having a * will require a note in the Notes section of this table, otherwise the compliance status in Table C will say "DOES NOT COMPLY".*

01	<input checked="" type="checkbox"/>	Alteration scope includes a one-for-one luminaire alteration within a building or tenant space of 5,000 ft ² or less per §141.0(b)2(iii).			
02	<input type="checkbox"/>	At least one complete floor or complete tenant space includes a one-for-one luminaire alteration of 50 or less luminaires, per annum. These spaces do not need to comply with Part 6 requirements and therefore do not need to be included in tables below per Exception 6 to §141.0(b)2.	Applicable Spaces	OR	<input type="checkbox"/> Exception 6 applies to all spaces within the permit application

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

62



NRCC-LTI-E: One-for-One Method

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

CALIFORNIA ENERGY COMMISSION
 NRCC-LTI-E

CERTIFICATE OF COMPLIANCE
 Project Name: Example Report Page: Page 4 of 6
 Project Address: Alteration Date Prepared: 2/23/2020

Fixture Schedule (Include all luminaires being altered in the project)

Pre-alteration Luminaire Information						Post-alteration Luminaire Information						
Name or Item Tag	Complete Luminaire Description	Watts per luminaire ¹	How Wattage is Determined	Total number of Luminaires	Total Watts	Name or Item Tag	Complete Luminaire Description	Watts per luminaire ¹	How Wattage is Determined	Total number of Luminaires	Total Watts	
Can	Can Light	100	Other	15	1,500	Can	LED Driver	45	Other ²	15	675	
0.55 Percent Power Reduction ²					Total Pre-alteration Wattage		Reset		Add Luminaire		Remove Last	
					1,500		Total Post-alteration Wattage					675

¹ FOOTNOTE: Authority Having Jurisdiction may ask for Luminaire cut sheets to confirm wattage used for compliance per §130.0(c)
² Must be at least 40% to comply with §141.0(b)(2)(III)

Mandatory Controls

15	16	17	18	19
Area Description	Primary Function Area	Area Controls §130.1(a)	Shut-Off Controls §130.1(c)	* NOTES: Controls with a * require a note in the space below explaining how compliance is achieved
Retail	Retail Merchandise Sales, Wholesale Showroom	Annunciated*	Whole Building: Auto Time Switch	Retail space allowed annunciation of manual on/off controls
		Reset	Add Space	Remove Last

R. 80% LIGHTING POWER FOR ALTERATIONS - CONTROLS EXCEPTIONS
 This Section Does Not Apply

S. DAYLIGHT DESIGN POWER ADJUSTMENT FACTOR (PAF)
 This Section Does Not Apply

T. DECLARATION OF REQUIRED CERTIFICATES OF INSTALLATION
 Table Instructions: Selections have been made based on information provided in previous tables of this document. If any selection needs to be changed, please explain why in Table E. Additional Remarks. These documents must be provided to the building inspector during construction and can be found online at https://www.energy.ca.gov/title24/2019standards/2019_compliance_documents/Nonresidential_Documents/NRCL/

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



NRCC-LTI-E: One-for-One Method

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

CALIFORNIA ENERGY COMMISSION
 NRCC-LTI-E

CERTIFICATE OF COMPLIANCE
 Project Name: Example Report Page: Page 5 of 6
 Project Address: Alteration Date Prepared: 2/23/2020

YES	NO	Form/Title	Field Inspector	
			Pass	Fail
<input checked="" type="radio"/>	<input type="radio"/>	NRCL-LTI-01-E - Must be submitted for all buildings	<input type="checkbox"/>	<input type="checkbox"/>
<input type="radio"/>	<input checked="" type="radio"/>	NRCL-LTI-02-E - Must be submitted for a lighting control system, or for an Energy Management Control System (EMCS), to be recognized for compliance.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="radio"/>	<input checked="" type="radio"/>	NRCL-LTI-04-E - Must be submitted for two interlocked systems serving an auditorium, a convention center, a conference room, a multipurpose room, or a theater to be recognized for compliance.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="radio"/>	<input checked="" type="radio"/>	NRCL-LTI-05-E - Must be submitted for a Power Adjustment Factor (PAF) to be recognized for compliance.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="radio"/>	<input checked="" type="radio"/>	NRCL-LTI-06-E - Must be submitted for additional wattage installed in a video conferencing studio to be recognized for compliance.	<input type="checkbox"/>	<input type="checkbox"/>

U. DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE
 Table Instructions: Selections have been made based on information provided in previous tables of this document. If any selection needs to be changed, please explain why in Table E. Additional Remarks. These documents must be provided to the building inspector during construction and any with "-A" in the form name must be completed through an Acceptance Test Technician Certification Provider (ATTCP). For more information visit: <http://www.energy.ca.gov/title24/attcp/providers.html>

YES	NO	Form/Title	Field Inspector	
			Pass	Fail
<input type="radio"/>	<input checked="" type="radio"/>	NRCA-LTI-02-A - Must be submitted for occupancy sensors and automatic time switch controls.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="radio"/>	<input checked="" type="radio"/>	NRCA-LTI-03-A - Must be submitted for automatic daylight controls.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="radio"/>	<input checked="" type="radio"/>	NRCA-LTI-04-A - Must be submitted for demand responsive lighting controls.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="radio"/>	<input checked="" type="radio"/>	NRCA-LTI-05-A - Must be submitted for institutional tuning power adjustment factor (PAF).	<input type="checkbox"/>	<input type="checkbox"/>
<input type="radio"/>	<input checked="" type="radio"/>	NRCA-ENV-03-F - Must be submitted for daylighting design power adjustment factors (PAF).	<input type="checkbox"/>	<input type="checkbox"/>

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



NRCC-LTI-E: One-for-One Method

STATE OF CALIFORNIA		CALIFORNIA ENERGY COMMISSION	
Indoor Lighting		NRCC-LTI-E	
NRCC-LTI-E (Created 01/20)			
CERTIFICATE OF COMPLIANCE		Page 6 of 6	
Project Name: Example	Report Page:	Date Prepared: 2/23/2020	
Project Address: Alteration	Date Prepared:	2/23/2020	
DOCUMENTATION AUTHOR'S DECLARATION STATEMENT			
I certify that this Certificate of Compliance documentation is accurate and complete			
Documentation Author Name: Gina Rodda	Documentation Author Signature:		
Company: Gabel Energy	Signature Date: Today		
Address: 20825 Nunes Ave Ste A	CEA/ HERS Certification Identification (if applicable):		
City/State/Zip: Castro Valley, CA 94546	Phone: 510-428-0803		
RESPONSIBLE PERSON'S DECLARATION STATEMENT			
I certify the following under penalty of perjury, under the laws of the State of California:			
1. The information provided on this Certificate of Compliance is true and correct.			
2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer)			
3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.			
4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.			
5. I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.			
Responsible Designer Name: Best Contractor Ever	Responsible Designer Signature:		
Company: Lighting Company	Date Signed: Today		
Address: 1234 First St	License: licensed contractor required		
City/State/Zip: Happy Town, CA	Phone: 000-000-0000		
Add Responsible Person			
CA Building Energy Efficiency Standards - 2019 Nonresidential Compliance: http://www.energy.ca.gov/title24/2019standards			
January 2020			

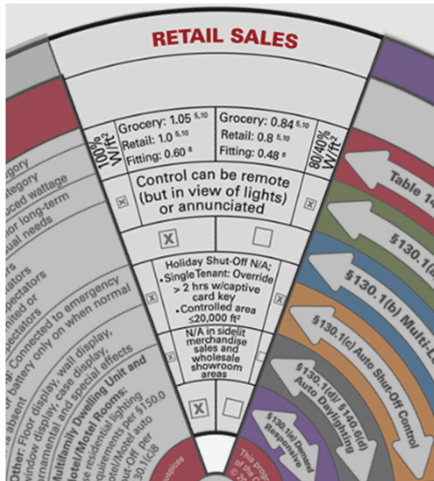
65



≤80% Area Category Method Example

Room	Light Tag	Description	(E) Light Wattage	(E) # of lights	(A) Light Wattage	(A) # of lights	Existing Lighting Controls			
							Manual on/off	Multi-level	Shut-Off	Day Lighting
Retail 780 ft ²	1	Wall Display	80 W Halogen screw in	16	25 W LED Screw in	16	Separate from cans	none	timeclock	none
	2	Can (general)	Incandescent 100 W ea	15	LED driver 45 ea	15	back rm	none	timeclock	none

- What is the Area Wattage Allowance?
1.0 W/ft² for general
- What is 80% of that allowance?
0.8 W/ft² x 780 ft² = 624 W
- Does the altered lighting wattage exceed 624 W?
Yes Altered: 15x45=675 W.
This method *cannot be used*, pursue tailored, or One-for-One
- Will any new lighting controls be required?
Yes Since ≤80% could not be achieved, multilevel will be required for the LED can lights



66



NRCC-LTI-E: ≤80% Area Category

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: Example Report Page: Page 1 of 6
 Project Address: Alteration Date Prepared: 2/23/2020

A. GENERAL INFORMATION

01 Project Location (city)	Example	04 Total Conditioned Floor Area (ft ²)	780
02 Climate Zone	3	05 Total Unconditioned Floor Area (ft ²)	0
03 Occupancy Types Within Project (select all that apply):		06 # of Stories (Habitable Above Grade)	1
<input type="checkbox"/> Office <input checked="" 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 Consists of (check all that apply):		Calculation Method	Area (ft ²)	Calculation Method	Area (ft ²)
<input type="checkbox"/>	New Lighting System				
<input checked="" type="checkbox"/>	Altered Lighting System	Add Parking Garage-Complete Bldg Method	780	Remove Parking Garage	
		Area Category	780		
		Add Altered Lighting System		Remove Last Altered System	
Total Area of Work (ft ²)			780		

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)				Total Allowed (Watts)	Adjusted Lighting Power per §140.6(a) (Watts)			Compliance Results
	01	02	03	04		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 (+)		Total Designed (Watts)	Adjustments PAF Control Credits §140.6(a)2 (-)	Total Adjusted (Watts) *Includes Adjustments	
	(See Table I)	(See Table I)	(See Table J)	(See Table K)	780	675	675	675	05 Must be ≥08 §140.6
Conditioned:		780			780	≥ 675	≥ 675	675	COMPLIES
Unconditioned:									

780 x .8 = 624 Does not Comply

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



NRCC-LTI-E: ≤80% Area Category

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

CERTIFICATE OF COMPLIANCE
 Project Name: Example Report Page: Page 2 of 6
 Project Address: Alteration Date Prepared: 2/23/2020

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.

Table H Indoor Lighting Controls Permit Applicant Notes:
 Retail: Manual on/off in storage room, daylighting not required for retail sidelit

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 Section	Modular (Track) Fixture	Small Aperture & Color Change*	Watts per luminaire?	How Wattage is determined	Total number luminaires	Exempt per §140.6(a)3	Design Watts	Field Inspector	
					Mfr. Spec?				Pass Fail	
2	Can			45		15		675	Pass	
Total Designed Watts CONDITIONED SPACES:								675		
								Reset	Add Row	Remove Last

H. INDOOR LIGHTING CONTROLS (Not Including PAFs)

Table Instructions: Please include lighting controls for conditioned and unconditioned spaces in this table. When an option having a * is selected, the notes section of this table must be completed. The lighting controls section of the Compliance Summary Table on the first page will show "DOES NOT COMPLY" if the notes are left blank.

Building Level Controls

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



NRCC-LTI-E: ≤80% Area Category

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

CALIFORNIA ENERGY COMMISSION
 NRCC-LTI-E

CERTIFICATE OF COMPLIANCE
 Project Name: Example Report Page: Page 3 of 6
 Project Address: Alteration Date Prepared: 2/23/2020

01 Mandatory Demand Response §110.12(c) Not Required ≤ 10,000 SF		02 Shut-Off Controls §130.1(c) Whole Building Timeswitch		03 Field Inspector Pass <input type="checkbox"/> Fail <input type="checkbox"/>	
---	--	---	--	--	--

Area Level Controls

04 Area Description Retail	05 Complete Building or Area Category Primary Function Area Retail Merchandise Sales, Wholesale Showroom	06 Area Controls §130.1(a) Annunciated*	07 Multi-Level Controls §130.1(b) Dimmer	08 Shut-Off Controls §130.1(c) Auto Timeswitch	09 Primary/Skylight Daylighting §130.1(d) Exempt*	10 Secondary Daylighting §140.6(d) Exempt*	11 Interlocked Systems §140.6(a)1 <input type="checkbox"/>	12 Field Inspector Pass <input type="checkbox"/> Fail <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

Plan Sheet Showing Daylit Zones:
 Retail Manual on/off in storage room, daylighting not required for retail sidelit

Reset Add Row Remove Last

I. LIGHTING POWER ALLOWANCE: COMPLETE BUILDING OR AREA CATEGORY METHODS

Table Instructions: Complete table for each area complying using the Complete Building or Area Category Methods per §140.6(b). Indicate if additional lighting power allowances per §140.6(c) comments per §140.6(a) are being used.

Conditioned Spaces

01 Area Description Retail	02 Complete Building or Area Category Primary Function Area Retail Merchandise Sales, Wholesale Showroom	03 Allowed Density (W/ft ²) 1	04 Area (ft ²) 780	05 Allowed Wattage (Watts) 780	06 Additional Allowances / Adjustment Area Category <input type="checkbox"/> PAF <input type="checkbox"/>
		TOTAL:	780	780	See Tables J or P for detail

Reset Add Row Remove Last

J. ADDITIONAL LIGHTING ALLOWANCE: AREA CATEGORY METHOD QUALIFYING LIGHTING SYSTEM

This Section Does Not Apply

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



NRCC-LTI-E: ≤80% Area Category

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

CALIFORNIA ENERGY COMMISSION
 NRCC-LTI-E

CERTIFICATE OF COMPLIANCE
 Project Name: Example Report Page: Page 4 of 6
 Project Address: Alteration Date Prepared: 2/23/2020

K. TAILORED METHOD GENERAL LIGHTING POWER ALLOWANCE

This Section Does Not Apply

L. ADDITIONAL LIGHTING ALLOWANCE: TAILORED WALL DISPLAY

This Section Does Not Apply

M. ADDITIONAL LIGHTING ALLOWANCE: TAILORED FLOOR AND TASK LIGHTING

This Section Does Not Apply

N. ADDITIONAL LIGHTING ALLOWANCE: TAILORED ORNAMENTAL/SPECIAL EFFECTS

This Section Does Not Apply

O. ADDITIONAL LIGHTING ALLOWANCE: TAILORED VERY VALUABLE MERCHANDISE

This Section Does Not Apply

P. POWER ADJUSTMENT: LIGHTING CONTROL CREDIT (POWER ADJUSTMENT FACTOR (PAF))

This Section Does Not Apply

Q. RATED POWER REDUCTION COMPLIANCE FOR ALTERATIONS

This Section Does Not Apply

R. 80% LIGHTING POWER FOR ALTERATIONS - CONTROLS EXCEPTIONS

This Section Does Not Apply

S. DAYLIGHT DESIGN POWER ADJUSTMENT FACTOR (PAF)

This Section Does Not Apply

T. DECLARATION OF REQUIRED CERTIFICATES OF INSTALLATION

Table Instructions: Selections have been made based on information provided in previous tables of this document. If any selection needs to be changed, please explain why in Table E. Additional Remarks. These documents must be provided to the building inspector during construction and can be found online at https://www2.energy.ca.gov/title24/2019standards/2019_compliance_documents/Nonresidential_documents/NRCC/

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



NRCC-LTI-E: ≤80% Area Category

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

CALIFORNIA ENERGY COMMISSION
 NRCC-LTI-E

CERTIFICATE OF COMPLIANCE
 Project Name: Example Report Page: Page 5 of 6
 Project Address: Alteration Date Prepared: 2/23/2020

YES	NO	Form/Title	Field Inspector	
			Pass	Fail
<input checked="" type="radio"/>	<input type="radio"/>	NRCC-LTI-01-E - Must be submitted for all buildings	<input type="checkbox"/>	<input type="checkbox"/>
<input type="radio"/>	<input checked="" type="radio"/>	NRCC-LTI-02-E - Must be submitted for a lighting control system, or for an Energy Management Control System (EMCS), to be recognized for compliance.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="radio"/>	<input checked="" type="radio"/>	NRCC-LTI-04-E - Must be submitted for two interlocked systems serving an auditorium, a convention center, a conference room, a multipurpose room, or a theater to be recognized for compliance.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="radio"/>	<input checked="" type="radio"/>	NRCC-LTI-05-E - Must be submitted for a Power Adjustment Factor (PAF) to be recognized for compliance.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="radio"/>	<input checked="" type="radio"/>	NRCC-LTI-06-E - Must be submitted for additional wattage installed in a video conferencing studio to be recognized for compliance.	<input type="checkbox"/>	<input type="checkbox"/>

U. DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE

Table Instructions: Selections have been made based on information provided in previous tables of this document. If any selection needs to be changed, please explain why in Table E, Additional Remarks. These documents must be provided to the building inspector during construction and any with "A" in the form name must be completed through an Acceptance Test Technician Certification Provider (ATTCP). For more information visit: <http://www.energy.ca.gov/title24/attcp/providers.html>

YES	NO	Form/Title	Field Inspector	
			Pass	Fail
<input checked="" type="radio"/>	<input type="radio"/>	NRCA-LTI-02-A - Must be submitted for occupancy sensors and automatic time switch controls.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="radio"/>	<input checked="" type="radio"/>	NRCA-LTI-03-A - Must be submitted for automatic daylight controls.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="radio"/>	<input checked="" type="radio"/>	NRCA-LTI-04-A - Must be submitted for demand responsive lighting controls.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="radio"/>	<input checked="" type="radio"/>	NRCA-LTI-05-A - Must be submitted for institutional tuning power adjustment factor (PAF).	<input type="checkbox"/>	<input type="checkbox"/>
<input type="radio"/>	<input checked="" type="radio"/>	NRCA-ENV-03-F - Must be submitted for daylighting design power adjustment factors (PAF).	<input type="checkbox"/>	<input type="checkbox"/>

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

71



NRCC-LTI-E: ≤80% Area Category

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

CALIFORNIA ENERGY COMMISSION
 NRCC-LTI-E

CERTIFICATE OF COMPLIANCE
 Project Name: Example Report Page: Page 6 of 6
 Project Address: Alteration Date Prepared: 2/23/2020

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT

I certify that this Certificate of Compliance documentation is accurate and complete

Documentation Author Name: Gina Rodda Documentation Author Signature: _____
 Company: Gabel Energy Signature Date: Today
 Address: 20825 Nunes Ave Ste A CEA/ HERS Certification Identification (if applicable): _____
 City/State/Zip: Castro Valley, CA 94546 Phone: 510-428-0803

RESPONSIBLE PERSON'S DECLARATION STATEMENT

I certify the following under penalty of perjury, under the laws of the State of California:

- The information provided on this Certificate of Compliance is true and correct.
- I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer)
- The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
- The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
- I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.

Responsible Designer Name: Best Contractor Ever Responsible Designer Signature: _____
 Company: Lighting Company Date Signed: Today
 Address: 1234 First St License: licensed contractor required
 City/State/Zip: Happy Town, CA Phone: 000-000-0000

[Add Responsible Person](#)

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

72



Construction: NRCI

Certificate of Installation



- ✦ Provided by installing contractor or General Contractor during construction and posted on site.
- ✦ Reviewed by Building Inspector.
- ✦ Belong to the Building Owner.

NRCI-LTS-01-E: *Certificate of Installation and Controls*

NRCI-LTO-01-E: *Certificate of Installation*
NRCI-LTO-02-E: *Lighting Controls-EMCS Controls*

NRCI-LTI-01-E: *Certificate of Installation*
NRCI-LTI-02-E: *Lighting Controls-EMCS Controls*
NRCI-LTI-03-E: *Track Lighting*
NRCI-LTI-04-E: *Lighting Controls-Interlocked Systems*
NRCI-LTI-05-E: *Lighting Controls-Power Adjustment Factors (PAF)*
NRCI-LTI-06-E: *Additional Video Lighting*



NRCI-LTI-01-E: Indoor Lighting

STATE OF CALIFORNIA
INDOOR LIGHTING
CEC-NRCI-LTI-01-E (Revised 01/16) CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF INSTALLATION NRCI-LTI-01-E (Page 1 of 2)

Indoor Lighting

Project Name: _____ Improvement Agency: _____ Permit Number: _____
 Project Address: _____ City: _____ Zip Code: _____

GENERAL INFORMATION

DATE OF BUILDING PERMIT: _____ PERMIT # _____

BUILDING TYPE Nonresidential High-Rise Res (Common Area) Hotel/Motel (Common Area)

PHASE OF CONSTRUCTION New Construction Addition Alteration Unconditioned

SCOPE OF RESPONSIBILITY

Enter the date of approval by enforcement agency of the Certificate of Compliance that provides the specifications for the energy efficiency measures for the scope of responsibility for this Installation Certificate. Date: _____

In the table below identify all applicable construction documents that specify the requirements for the scope of responsibility reported by this Installation Certificate (continued).

Document Title or Description	Applicable Sheets or Pages, Tables, Schedules, etc.	Date Approved By the Enforcement Agency
Packing Slips	Controls installed	
Cutsheets	Fixtures installed	
Submittals	Fixtures and Controls	

CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance January 2016



Building Inspection: NRCA

Certificate of Acceptance



- ✦ Provided by Acceptance Test Technician.
- ✦ Made available BEFORE building inspector arrives for final.
- ✦ Belong to the Building Owner

NRCA-LTO-02-E: Controls

NRCA-LTI-02-E: Auto Shut-Off Controls

NRCA-LTI-03-E: Automatic Daylighting Controls

NRCA-LTI-04-E: Demand Response Controls

NRCA-LTI-05-E: Institutional Tuning

ALTERATIONS: Acceptance testing not required for alteration projects where controls added to control 20 or less luminaires for entire project.



CLCATT Training



CALCTP: www.calctp.org

NLCAA: www.nlcaa.org

- ✦ Training includes theoretical and hands-on training
- ✦ Participants have at least 3 years of verifiable professional experience with lighting controls
- ✦ Written and practical exams are required

..both hands-on experience and theoretical training such that Acceptance Test Technicians demonstrate their ability to apply the Building Energy Efficiency Standards acceptance testing and documentation requirements to a comprehensive variety of lighting control systems and networks that are reflective of the range of systems currently encountered in the field.

§10-103-A



National Lighting Contractors Association of America





NRCA Forms to be from Provider

NLCAA

Project Status Report – Lighting Controls Acceptance Testing
National Lighting Contractors Association of America
(Revised 04/2022)



PROJECT INFORMATION

Code Cycle:
Project Name:
NLCAA Project Number:
Project Address:
Permit Number:
Enforcement Agency:
Acceptance Test:
Acceptance Test

STATE OF CALIFORNIA
SHUT-OFF LIGHTING CONTROL ACCEPTANCE DOCUMENT
CSC-NLCAA-TLCA-PROVED-0101



FORMS INCLUDE

- NRCA-LT14
- NRCA-LT14
- NRCA-LT14
- NRCA-LT14
- NRCA-LT14
- NRCA-LT14

CERTIFICATE OF ACCEPTANCE		
Shut-Off Lighting Control Acceptance Document		
NRCA-LT14-A		
Project Name:	Enforcement Agency:	Permit Number:
Project Address:	City:	Zip Code:
Building:	Floor:	Room:
Compliance Results:		Enforcement Agency Use: Checked by/Date
<input checked="" type="checkbox"/> COMPLIES or <input type="checkbox"/> DOES NOT COMPLY		

TESTED AREA

FORM

Automatic Time Switch Lighting Controls	
A-1. Automatic Time Switch Lighting Control Construction Inspection (NA7.6.2.4)	
<input type="checkbox"/> a.	Automatic time switch controls are programmed with acceptable weekday, weekend, and holiday (if applicable) schedules. (NA7.6.2.4(a), §110.9(b)(4), §130.1(c)(1A), §130.1(c)(4))
<input type="checkbox"/> b.	Document for the owner, weekday, weekend, and holiday schedules, as well as all set-up and preference program settings. (NA7.6.2.4(b))
<input type="checkbox"/> c.	The correct time and date are properly set in the time switch. (NA7.6.2.4(c))
<input type="checkbox"/> d.	The battery backup (if applicable) is installed and energized. (NA7.6.2.4(d), §110.9(b)(1))
<input type="checkbox"/> e.	Override time limit is no more than 2 hours. (NA7.6.2.4(e), §110.9(b)(4), §130.1(c)(3B) OR The automatic time switch control's override time is exempt from the 2-hour limit. (EXCEPTION to §130.1(c)(3B))
<input type="checkbox"/> f.	Override switches remote from area with controlled luminaires have annunciator lights. (NA7.6.2.4(f), §130.1(c)(3A), §130.1(c)(4) OR The manual override switch is exempt from being in the same enclosed area with the lighting it controls. (EXCEPTION 1 to §130.1(c)(4))
Construction Inspection Compliance: <input type="checkbox"/> Complies <input type="checkbox"/> Does Not Comply	
B-1. Automatic Time Switch Lighting Control Functional Testing (NA7.6.2.5)	
Confirm compliance ("yes" / "no") for the control being tested.	
Step 1: Simulate occupied condition. (NA7.6.2.5(a))	
<input type="checkbox"/> a.	All lights can be turned on and off by their respective area control switch. (NA7.6.2.5(a)(1))
<input type="checkbox"/> b.	The switch only operates lighting in the enclosed space (ceiling-height partitioned area) in which the switch is located. (NA7.6.2.5(a)(2), §130.1(c)(7))
<input type="checkbox"/> c.	For the area controlled by an automatic time switch control with a time override located in and for the area, the lighting can be turned on manually by engaging the time override. The lighting is configured to remain on for no more than 2 hours, unless the area is exempt from the 2-hour time override limit. (NA7.6.2.5(a)(3), §110.9(b)(4), §130.1(c)(3B), EXCEPTION to §130.1(c)(3B))
<input type="checkbox"/> d.	For the area controlled by an automatic time switch control with an automatic holiday shut-off feature, the lighting in the area can be turned off automatically by engaging the holiday shut-off. (NA7.6.2.5(a)(4), §110.9(b)(4), §130.1(c)(4) OR The automatic time switch control is exempt from incorporating an automatic holiday shut-off feature. (EXCEPTION to §130.1(c)(4))
<input type="checkbox"/> e.	For the area controlled by an automatic time switch control with manual mode configured, the lighting in the area can be turned on manually when it is manually activated. (NA7.6.2.5(a)(5), §130.1(c)(1E) OR The automatic time switch control does not include or utilize a manual mode. §130.1(c)(1E))
Step 2: Simulate unoccupied condition. (NA7.6.2.5(b))	
<input type="checkbox"/> a.	All non-exempt lighting turns off in accordance with the programmed time switch schedules. (NA7.6.2.5(b)(1), §130.1(c)(1A))
<input type="checkbox"/> b.	Manual override switch allows only the lights in the enclosed space (ceiling height partitioned) where the override switch is located to turn on or remain on until the next scheduled shut-off occurs. (NA7.6.2.5(b)(2), §130.1(c)(7), §130.1(c)(3))
Functional Testing Compliance: <input type="checkbox"/> Complies <input type="checkbox"/> Does Not Comply	

CALCTP

CERTIFICATE OF ACCEPTANCE		NRCA/ALCA
DATE TESTED	TESTER NAME	TESTER TITLE
DATE TESTED	TESTER NAME	TESTER TITLE
DATE TESTED	TESTER NAME	TESTER TITLE
Compliance Results:		
<input type="checkbox"/> DOES NOT COMPLY		
Enforcement Agency User: Checked by/Date		

SHUT-OFF LIGHTING CONTROL ACCEPTANCE DOCUMENT

Submittal: This document is used to demonstrate compliance with acceptance requirements in §130.4(c) and Reference Non-residential Appendix NA-7.6.2 for shut-off lighting controls. Attach additional sets of pages 1 through 5, as required, for all controls that must be tested.

Indicate all types of shut-off controls tested for this project:

- Automatic time switch lighting controls (Sections A-1 and B-1 of this document should be completed)
- Occupant sensing lighting controls (including occupant sensors, partial-ON occupant sensors, partial-OFF occupant sensors, and/or vacancy sensors) (Sections A-2 and B-2 of this document should be completed)

A-1. Automatic Time Switch Lighting Control Construction Inspection (NA7.6.2.4)

- a. Automatic time switch controls are programmed with acceptable weekday, weekend, and holiday (if applicable) schedules. (NA7.6.2.4(a), §110.9(b)(4), §130.1(c)(1A), §130.1(c)(4))
- b. Document for the owner, weekday, weekend, and holiday schedules, as well as all set-up and preference program settings. (NA7.6.2.4(b))
- c. The correct time and date are properly set in the time switch. (NA7.6.2.4(c))
- d. The battery backup (if applicable) is installed and energized. (NA7.6.2.4(d), §110.9(b)(1))
- e. Override time limit is no more than 2 hours. (NA7.6.2.4(e), §110.9(b)(4), §130.1(c)(3B) OR The automatic time switch control's override time is exempt from the 2-hour limit. (EXCEPTION to §130.1(c)(3B))
- f. Override switches remote from area with controlled luminaires have annunciator lights. (NA7.6.2.4(f), §130.1(c)(3A), §130.1(c)(4) OR The manual override switch is exempt from being in the same enclosed area with the lighting it controls. (EXCEPTION 1 to §130.1(c)(4))

Construction Inspection Compliance: Complies Does Not Comply



California Advanced Lighting Controls Training Program

This is page 1 of 4



Next Steps



HELPING YOU PLAY YOUR CARDS RIGHT

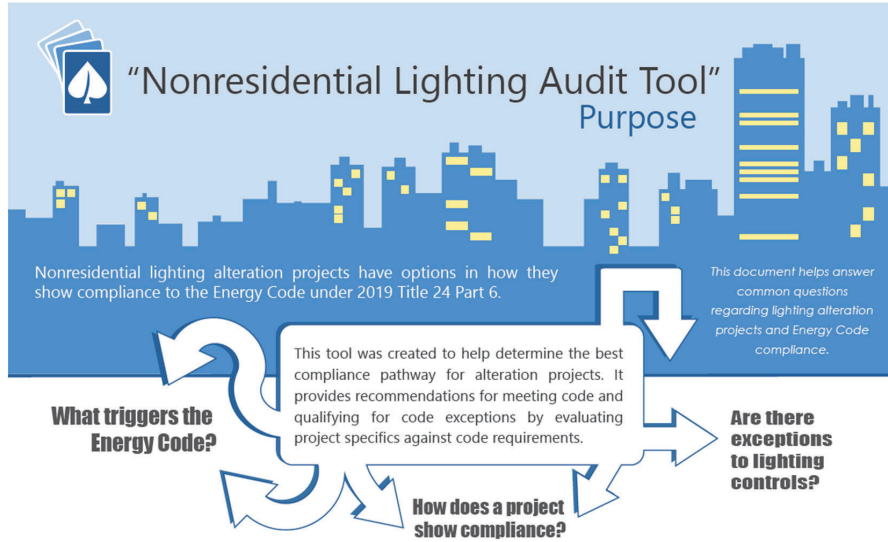




NR Indoor Lighting Audit Tool

✦ Do you want to be on our Beta Team?

ECA NR Lighting Audit BETA



Ace Tools™

A variety of tools to help you identify the forms, installation techniques, and standards relevant to building projects in California.

Ace it



Ace Training™

Targeted classroom and online training on Title 24, Part 6 and Title 20 addressing a variety of stakeholders and measures.

Ace it

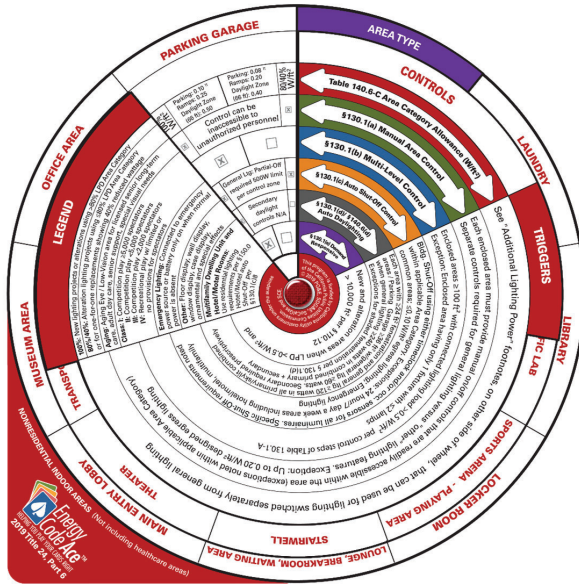


Ace Resources™

Application Guides, Facts Sheets, Trigger Sheets and Checklists to help you understand how and when to comply with California's building and appliance energy efficiency standards.

Ace it





How to order!

- Order up to 5 wheels free of charge by emailing info@EnergyCodeAce.com
- Include your name and shipping address.





Title 24, Part 6

Fact Sheet

2016 & 2019 ENERGY CODE Compliance Forms

Nonresidential Certificates of Compliance (NRCC)

Tips & Tricks – Dynamic Compliance Forms


Action	Tip
Accessing California Energy Commission Compliance Forms	Energy Code Ace (NRC): www.energycodeace.com/nonresidentialforms Residential Form: www.energycodeace.com/residentialforms Energy Pro (must purchase software): www.energypro.com/shop/ <i>Download dynamic PDF frequently for latest version. If using Energy Pro, be sure you have the latest version.</i>
Opening Dynamic Forms	If you see the error "Please Wait...": 1. Download the form and save to location on your computer. 2. Open it from there using Adobe Reader (2017 free version seems to work best - download here: www.adobe.com/reader or Bluebeam). <i>There are known issues when using PDF software other than Adobe Reader (such as Bluebeam, Adobe Acrobat DC and many others!).</i>
Importing	1. After completing in Adobe Reader - SAVE (save often). 2. Print to pdf for a "static" version. 3. Import to CAD or Bluebeam as usual. <i>The form will need to be "locked" in place by printing to PDF to import into CAD or Bluebeam.</i>
Table C says "DOES NOT COMPLY"	1. In Table C, look for "Nc" columns, and then review the table connected to the "Nc" and verify inputs are compliant. 2. Table D then also provide some direction on which table needs additional information to be considered complete. <i>Confirm you have filed out ALL editable cells.</i>
Using Table Tips	Table tips are included in the top right of tables offering tips about completing that table. Simply click on  to receive: 1. Energy Code guidance. 2. Indication of how tables are related to each other. <i>If a table is closed with "This Section Does Not Apply" and you think it should apply, look at Table Tips.</i>
Employees in Tables are Blank	1. Complete the form in order from start to finish - many tables supplement subsequent tables. 2. All fields which are not grayed out must be completed. 3. Tag On (should be unique and not duplicated). <i>Confirm you are using Adobe Reader (2017); this is a known issue with other PDF software such as Bluebeam.</i>
Using Reset Button	Each table includes a Reset button which deletes all project data that have been entered into the table and resets you to the start of that table. This can help the form connect itself, but you will need to reenter your data. <i>If a table starts acting funny (which can happen when you change a lot of information on the table) hit .</i>
Signing Forms	1. After completing in Adobe Reader - SAVE (save often). 2. Sign like you typically would a static PDF document. <i>Some of the forms allow multiple "Responsible Person" signatures (e.g., NRCC-CNR-E). In these cases, the electronic signature function will not work. Use the directions above to include electronic signatures.</i>

Still Have Questions?
Email us at forms.feedback@energycodeace.com

For More Information

Additional Resources

- Energy Code Ace
- As 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:
 - Forms Ace™
 - Identify and print the forms you need for your project - and for 2019 NRCC forms, use our virtual compliance assistant to help you complete your forms online and verify compliance.
 - Training
- 2019 Energy Code
 - Online On-Demand - Decoding NRCC: Let's Talk 2019 Nonresidential Dynamic Forms
 - 2019 NRCC-CNR Dynamic Form recorded "walkthrough"
 - 2019 NRCC-ECC Dynamic Form recorded "walkthrough"
 - 2019 NRCC-ENV Dynamic Form recorded "walkthrough"
 - 2019 NRCC-LTI Dynamic Form recorded "walkthrough"
 - 2019 NRCC-LTD Dynamic Form recorded "walkthrough"
 - 2019 NRCC-LTS Dynamic Form recorded "walkthrough"
 - 2019 NRCC-MCH Dynamic Form recorded "walkthrough"
 - 2019 NRCC-PB Dynamic Form recorded "walkthrough"
 - 2019 NRCC-PRC Dynamic Form recorded "walkthrough"



Comply With Me

Energy Code Ace presents

2019 Dynamic Forms

NRCC-LTI-E:
An Introduction



Other ECA Resources

The screenshot shows the Energy Code Ace website interface. At the top, there's a navigation bar with links like 'About', 'Contact Us', 'Create Account', and 'Sign In'. Below the navigation is a large banner with the Energy Code Ace logo and a 'Submit a Question' button. A sidebar on the left contains 'Tools Ace' and 'Training Ace' dropdown menus, and a 'Resources Ace' section with a red heart icon. The main content area features a 'Submit a Question' form with fields for 'Name (optional)', 'Email Address', and 'Question', and a 'Submit' button. Below the form are links for 'Resources Ace', 'Application Guides', and 'Submit a Question'.

83



Energy Commission Resources

The screenshot shows the California Energy Commission website. The header includes the logo and navigation links. The main content area features a section titled 'Online Resource Center' with a description of the center's purpose. Below this are several expandable sections: 'Compliance Forms', 'Energy Rates', 'Trainings and Upcoming Events', and 'Exhibitor Booth Handouts'. There is also a 'CONTACT' section with a phone number and a 'SUBSCRIBE' section for the Building Energy Efficiency Standards newsletter.

CEC Hotline

Monday – Friday, 8 a.m. to noon, 1 p.m. to 4:30 p.m.
 1-800-772-3300 (CA), (916) 654-5106 (Outside CA)
 Email: Title24@energy.ca.gov

List Server & Newsletter

Main conduit for stakeholder communication:
www.energy.ca.gov/listservers/
 (Subscribe to Building Standards & Blueprint Newsletter)

Download the Blueprint Newsletter:
www.energy.ca.gov/efficiency/blueprint

Other Useful Links

CEC Online Resource Center:
<https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/online-resource-center>
 Approved Compliance Software:
www.energy.ca.gov/title24/2019standards/2019_computer_prog_list.html

84



Wrap Up



HELPING YOU PLAY YOUR CARDS RIGHT