

LIGHTING CONTROLS TITLE 24 2019 REFERENCE GUIDE



sixteen**5**hundred
bringing ideas to light

TABLE OF CONTENTS

Indoor Lighting Power Density..... PAGE 3

Indoor Lighting Control Matrix.....PAGE 4-6

Indoor Lighting AlterationsPAGE 7

Outdoor Lighting Controls Matrix.....PAGE 8

Outdoor Lighting Quick Tip.....PAGE 9

Residential Indoor and Outdoor Matrix.....PAGE 10

16500 Services Offered.....PAGE 11

Title 24 2019 Notable Changes.....PAGE 12

TABLE 140.6-C AREA CATEGORY METHOD — LIGHTING POWER DENSITY VALUES (WATTS/SQ FT) Quick Reference Guide *

Primary Function Area	Allowed Watts/sqft	Primary Function Area	Allowed Watts/sqft
Auditorium	0.70	Parking Garage—Decks	0.10
Auto Repair/Maintenance	0.55	Parking Garage—Ramps	0.25
Audience Seating Area	0.60	Parking Garage Daylight Adaptation (Auto Entries)	0.50
Beauty Salon	0.80	Pharmacy	1.10
Civic Meeting Place	1.00	Retail Sales—Grocery	1.05
Classroom, Lecture, Training, Vocational Area	0.70	Retail Merchandise	1.00
Commercial/Industrial Storage—Warehouse	0.45	Retail—Fitting Rooms	0.60
Commercial/Industrial Storage— Shipping & Handling	0.60	Restaurant Kitchen	0.95
Convention, Conference, Multipurpose/Meeting	0.85	Theater—Motion	0.60
Copy Room	0.50	Theater—Performance	1.00
Corridor Area	0.60	Labs	1.00
Dining Area—Bar/Lounge & Fine Dining	0.55	Healthcare Facility & Hospitals—Exam/Treatment	1.15
Dining Area—Cafeteria/Fast Food	0.40	Healthcare Facility & Hospitals—Imaging Room	1.00
Dining Area— Family and Leisure	0.50	Healthcare Facility & Hospitals—Medical Supply	0.55
Electrical, Mechanical, Telephone Rooms	0.40	Healthcare Facility & Hospitals—Nursery	0.95
Exercise/Fitness Center and Gyms	0.50	Healthcare Facility & Hospitals—Nurse Station	0.75
Hotel Function	0.85	Healthcare Facility & Hospitals—Operating Room	1.90
Museum—Exhibition/Display	0.60	Healthcare Facility & Hospitals—Patient Room	0.55
Financial Transaction Area	0.80	Healthcare Facility & Hospitals—Physical Therapy	0.85
General/Commercial & Industrial Work—Low Bay	0.60	Healthcare Facility & Hospitals—Recovery Room	0.90
General/Commercial & Industrial Work—High Bay	0.65	Laundry Area	0.45
General/Commercial & Industrial Work—Precision	0.85	Religious Worship	0.95
Library—Reading Area	0.80	Restrooms	0.65
Library—Stacks Area	1.10	Transportation—Baggage Area	0.40
Lobby—Main Entry	0.85	Transportation—Ticketing Area	0.45
Locker Room	0.45	Sports Arena Playing Area—Class I	2.25
Lounge, Breakroom/Waiting Area	0.65	Sports Arena Playing Area—Class II	1.45
Concourse & Atria Area	0.90	Sports Arena Playing Area—Class III	1.10
Office >250 sf	0.65	Sports Arena Playing Area—Class IV	0.75
Office <250sf	0.70	Stairwell	0.50
Open Office	0.60	All Other	0.40

* Refer to the 2019 Title 24 Standards Section 140.6-C for further wattage allowances

NON-RESIDENTIAL & HIGH-RISE RESIDENTIAL INDOOR AREAS (Section 130.1 a-e; 130.5d)		MINIMUM REQUIRED CONTROL TYPE						
		A	B	C		D	R	E
		Manual Control		Auto-Shut-Off		Automatic Daylighting Control	120V Outlet Control	Demand Response
AREA TYPE*	Size (Sqft)	On/Off	Multi- Level	Occupant Sensor	Auto Time Switch			
Offices	≤250	A1	B1	C1		D1	R1	E1
	>250	A1	B1		C2	D1	R1	E1
Offices—Open	≤250	A1	B1	C1		D1	R1	E1
	>250	A1	B1		C2	D1	R1	E1
Conference Room	ALL	A1	B1	C1		D1	R1	E1
Multi-Purpose Room	<1000	A1	B1	C1		D1	R2	E1
	≥1000	A1	B1		C2	D1	R2	E1
Copy Room	≤250	A1	B1	C1		D1	R1	E1
	>250	A1	B1		C2	D1	R1	E1
Office Kitchen Area	ALL	A1	B1		C2	D1	R1	E1
Corridor	ALL	A2	B3	C3		D1		E1
Common Area Corridor (Resi)**	ALL	A2	B3	C4		D1		E1
Stairwell	ALL	A2	B3	C3		D1		E1
Stairwell (Resi)**	ALL	A2	B3	C4		D1		E1
Lobby	ALL	A1	B1	C3		D1	R1	E1
Bathroom—Single Stall	<70	A1		C1		D1		E1
Restroom—Public Single Stall	ALL	A1		C1		D1		E1
Restroom—Public 2+ Stalls	ALL	A2		C1		D1		E1
Closet (Resi)**	<70	A1			C5	D1		E1
Warehouse—Open Area	ALL	A1	B3	C6		D1		E1
Warehouse—Aisle	ALL	A3	B3	C6		D1		E1
Server Room—Aisle	ALL	A3	B3		C5	D1		E1
Electrical Rm. Subj. CEC 110.26(D)	ALL	A1	B1			D1		E1
Classroom	ALL	A1	B2	C1		D1		E1
Library Stack Aisle***	ALL	A3	B3	C7		D1		E1
Loading and/or Unloading	ALL	A1	B3		C8	D1		E1
Parking Garage (Interior Areas)	ALL	A2	B3		C8	D2		E1
Parking Garage Roof/Outdoor	SEE OUTDOOR LIGHTING CONTROLS							
Dwelling Units	SEE INDOOR RESIDENTIAL AREAS							
Hotel/Motel Guest Rooms								
Dwelling Accommodations for Dormitories, Senior Housing, and Fire Stations								
INDOOR AREAS NOT LISTED	ALL	A1	B1	C2		D1		E1

NOTES:

*Area Types in this table are as defined in T24 Parts 1 and 6 and apply to areas/rooms based on the activities or use in the room/area or space and not necessarily on the name of the room/area shown on the plans.

**These areas apply to High-Rise Residential (4 or more habitable stories) and Hotel/Motel only.

***Applies only to library book stack aisles that are 10' or longer (if dead-ended), and 20' or longer (if accessible from both ends).

KEY DEFINITIONS:

OFFICE AREA: any room or area in a building of CBC Group B Occupancy in which business, clerical, or professional activities are conducted, regardless of its assigned room name.

BATHROOM: A residential room or area containing a sink use for personal hygiene, toilet, shower, or tub.

RESTROOM: A non-residential room or area providing personal facilities such as toilets and washbasins.

DAYLIGHT TRANSITION ZONE (Parking Garage): the interior path of travel needed to transition from exterior daylighting levels to interior light levels. Excludes adjacent parking areas.

DEDICATED RAMPS: parking garage ramps that do not have adjacent parking.

KEYED NOTES FOR EACH SPACE/AREA TYPE		GENERAL NOTES FOR EACH CONTROL TYPE
A	A1 REQUIRED. Must be located within the room and accessible to users. EXCEPT, in Malls, Atria, Auditorium areas, Retail Merchandise Sales areas, Wholesale Showroom areas, Commercial/Industrial Storage and Work areas, Convention Centers, Arenas, Psychiatric/Secure areas in Health Facilities, other areas that may pose health/safety hazard, the control may be located in other areas provided the user can see the controlled lighting, or the status of the controlled lighting is annunciated to the user.	<p>MULTI-LEVEL: Must provide the required steps required under column B.</p> <p>OVERRIDES: Other controls may not disable functionality of required manual controls.</p> <p>SEPARATE CONTROL: General, floor & wall display, window display, case display, ornamental, and special effects lighting must each have independent manual control. Track heads NOT EXEMPT.</p> <p>MEANS OF EGRESS LIGHTING: <u>Qualifying</u>* egress lighting must be controlled separately; control accessible only to authorized personnel. *To <u>qualify</u>, egress lighting may be up to 0.2W/sqft of lighting in areas properly designated on the</p>
	A2 REQUIRED. May be inaccessible to unauthorized personnel.	
	A3 Same as A1, and independent MANUAL control not required for each aisle.	
B	B1 REQUIRED. General lighting greater than 100 sqft with lighting load greater than 0.5W/sqft. See table 130.1-A for specifics. EXCEPT, Restrooms; Healthcare Facilities; and in areas that has only 1 luminaire with no more than 2 lamps	<p>APPLICATION: <u>These requirements apply only to general lighting.</u></p> <p>OTHER PROVISIONS: exception from this requirement does not except multi-level operation/control required by other provisions, such as Partial-ON, Partial-OFF, Auto-Daylighting-Control, and/or Demand Responsive Control requirements.</p>
	B2 REQUIRED, however, if connected general lighting is 0.7W/sqft or less, minimum one control step is required between 30%-70% of full rated power.	
	B3 REQUIRED, minimum of one control step between 20%-60% of full rated power.	
C	C1 REQUIRED. Auto/Vacancy/Partial ON between 50-70% power if multi-level control is required.	<p>EXCEPTIONS FOR AUTO SHUT-OFF: Healthcare Facilities; 24/365 day areas; Electrical equipment rooms</p> <p>OVERRIDE: Auto-Time-Switch OFF function may be overridden for up to 2-hours during typically unoccupied times. EXCEPTION: malls, auditoriums, single-tenant retail, industrial, and arenas, provided a captive-key override is used.</p> <p>SEPARATE CONTROL: For lighting on each floor, other than stairwells and enclosed space by ceiling height partition not exceeding 5,000 sqft (20,000 sqft in Malls, Auditoriums, Single-Tenant Retail, Industrial, Convention Centers, and Arenas)</p>
	C2 REQUIRED. Auto-Shut-Off by occupancy sensor, <u>or</u> Auto-Time-Switch.	
	C3 REQUIRED. Auto-ON operation (to 100%) by occupancy sensor required. Partial-OFF by occupancy sensor required (to 50% power or lower after vacancy). Full Auto-Shut-Off required—by occupancy sensor (max. 20-min. time delay) <u>or</u> by Auto-Time-Switch (during typically unoccupied times).	
	C4 REQUIRED. Auto-ON operation (to 100%) by occupancy sensor required. Partial-OFF by occupancy sensor required (to 50% power or lower after vacancy). Full Auto-Shut-Off required by occupancy sensor (max. 20-min. time delay).	
	C5 REQUIRED. Auto-Shut-Off by occupant sensing device, <u>or</u> Auto-Time-Switch, <u>or</u> Countdown-Timer-Switch. Countdown timer switch max setting 10 minutes for closets, 30 minutes for Server Aisles.	
	C6 REQUIRED. Partial-OFF to 50% power or lower by occupancy sensor required (60% or lower for MH or HPS lighting or lighting with power <80% of allowable power under the Area Category Method. Full Auto-Shut-Off required—may be by occupancy sensor (max. 20 min. time delay) or by Auto-Time-Switch (during typically unoccupied times). Each open area and aisle way must be controlled separately—no overlapping.	
	C7 REQUIRED. Partial-OFF to 50% power or lower by occupancy sensor required. Full Auto-Shut-Off required—may be by occupancy sensor (max. 20-min. delay) or by Auto-Time-Switch (during typically unoccupied times). Each open area and aisle way must be controlled separately—no overlapping.	
	C8 REQUIRED. Auto-ON operation (to 100%) by occupancy sensor required. Partial-OFF by occupancy sensor required after vacancy (to 20%-50% of design power) by occupancy sensor required. Control Granularity: No more than 500 watts of rated lighting power shall be controlled together as a single zone.	
D	D1 REQUIRED if the total glazing in the room/area is 24sqft or greater, <u>and</u> the total combined power of installed lighting in the Primary, Secondary Sidelit and Skylit Zones is 120 Watts or more. In controlled areas, when daylight provides >150% of the design illuminance received from the general lighting system at full power, lighting power in the daylight zone must be reduced by at least 65%. Separate control for luminaires in each type of daylight zone (primary, secondary, skylit). <u>Applies only to general lighting.</u> EXCEPTION: Skylight with structure/object blocking direct sunlight for 1500 daytime hours per year; Area adjacent to vertical glazing below overhang where it covers the glazing; Luminaires in sidelit daylight zones in retail merchandise sales and wholesale showroom areas;	
	D2 REQUIRED if the total glazing/opening in the area is 36sqft or greater, <u>and</u> the total combined power of installed lighting in the Sidelit Zones is 60 Watts or more. In a combined Primary/Secondary Zone, when daylight provides greater than 150% of the illuminance of controlled lighting alone (at the point of lowest illuminance in the Secondary Zone), lighting in that Zone shall be OFF/consume zero power. <u>Applies only to general lighting.</u> EXCEPTION: Luminaires in Daylight Transition Zones and Dedicated Ramps; Total combined general lighting power in primary and secondary is less than 60watts.	
R	R1 REQUIRED. Each area must have at least 1 controlled receptacle within 6 feet of any controlled receptacle; or all half-controlled split-wired receptacles. Controlled receptacles must be permanently marked. Control may be by local occupancy sensor or auto-time-switch.	<ol style="list-style-type: none"> Hardwired plug strips controlled by an occupancy sensor are acceptable. Exceptions: a) dedicated receptacles for refrigerators and water dispensers in kitchen areas; b) clock receptacles above 6' A.F.F.; and c) receptacles in copy rooms for network copiers, faxes, A/V and data equipment (not personal computers). d) receptacle circuits rated more than 20A. e) Receptacles connected an UPS. f) Receptacle in healthcare facilities
	R2 REQUIRED (as required in R1) if the Multi-Purpose room can be classified as an "Office Area" (see "Important Definitions" in this guide).	
E	E1 REQUIRED if the installed lighting within this area/space is greater than 0.5W/sqft, <u>and</u> if this area (space) is located within a building larger than 10,000 sqft. Lighting in this area must, together with all other areas within the building requiring Demand Responsive control, be capable of reducing power by at least 15% during the Demand Response Period. The controls must be capable of receiving and responding to at least one standards-based messaging protocol. EXCEPTIONS: Spaces under 0.5W/sqft ; Spaces where health or life safety statute, ordinance, or regulation does not permit lighting to be reduced. These do not count toward the 10,000 sqft threshold	

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

Luminaire Type	Minimum Required Control Steps (percent of full rated power)	Uniform level of illuminance shall be achieved by:		
Line-voltage sockets except GU-24	Continuous dimming 10-100 percent			
Low-voltage incandescent systems				
LED luminaires and LED source systems				
GU-24 rated for LED				
GU-24 sockets rated for fluorescent > 20 watts	Continuous dimming 20-100 percent			
Pin-based compact fluorescent > 20 watts ²				
GU-24 sockets rated for fluorescent ≤ 20 watts	Minimum one step between 30-70 percent	Stepped dimming; or Continuous dimming; or Switching alternate lamps in a luminaire		
Pin-based compact fluorescent ≤ 20 watts ²				
Linear fluorescent and U-bent fluorescent > 13 watts				
Linear fluorescent and U-bent fluorescent > 13 watts	Minimum one step in each range:			Stepped dimming; or Continuous dimming; or Switching alternate lamps in each luminaire, having a minimum of 4 lamps per luminaire illuminating the same area and in the same manner
	20-40 %	50-70 %	75-85 %	
Track Lighting	Minimum one step between 30 – 70 percent	Step dimming; or Continuous dimming; or Separately switching circuits in multi-circuit track with a minimum of two circuits.		
HID > 20 watts	Minimum one step between 50 - 70 percent	Stepped dimming; or Continuous dimming; or Switching alternate lamps in each luminaire, having a minimum of 2 lamps per luminaire, illuminating the same area and in the same manner.		
Induction > 25 watts				
Other light sources				

1. Full rated input power of ballast and lamp, corresponding to maximum ballast factor

2. Includes only pin based lamps: twin tube, multiple twin tube, and spiral lamps

EXCEPTION 1 to Table 130.1-A Minimum Required Control Steps: Classrooms with a connected general lighting load of 0.7 watts per square feet or less shall have a minimum of one control step between 30-70 percent of full rated power, regardless of luminaire type.

EXCEPTION 2 to Table 130.1-A Minimum Required Control Steps: Library stack aisles, aisle ways and open areas in warehouses, parking garages, parking areas, loading and unloading areas, stairwells, and corridors shall have a minimum of one control step between 20-60 percent of full rated power, regardless of luminaire type.

INDOOR LIGHTING SYSTEM ALTERATIONS Section 141.0(b)2I	MINIMUM REQUIRED CONTROL TYPE						
	A	B	C		D	R	E
	Manual Control		Auto-Shut-Off		Automatic Daylighting Control	120V Outlet Control	Demand Response
On/Off	Multi-Level	Occupant Sensor	Auto Time Switch				
10% or more luminaires in space*							
OPTION i	A	B	C		D	R	E
- comply with lighting power allowance (Section 140.6) - and meet control requirements Table 141.0F							
OPTION ii	A		C			R	
- not exceed 80% of lighting power allowance (Section 140.6) - and meet control requirements Table 141.0F							
OPTION iii	A		C			R	
- one for one luminaire alteration (more than 50 luminaires) within space of 5,000 sqft or less; - lower total altered luminaire wattage by at least 40% compared to total pre-altered wattage - and meet control requirements Table 141.0F							

NOTES:
1) Alteration to indoor lighting system does not prevent the operation of existing, unaltered controls and not alter controls to remove functions in Section 130.1
2) Alterations to lighting wiring are considered alterations to the lighting system.
*EXCEPTIONS TO INDOOR LIGHTING SYSTEM ALTERATIONS:
1) Alteration with less than 10% of luminaires on enclosed space
2) Alteration of portable luminaires, luminaires affixed to moveable partitions or lighting excluded per Section 140.6(a)3
3) Any enclosed space with 1 luminaire
4) Any alteration that would cause the disturbance of asbestos, unless it is made in conjunction with asbestos abatement
5) Acceptance testing requirements are not required for alteration where lighting controls are added to control 20 luminaires or less.
6) Any alteration limited to adding lighting controls or replacing lamps, ballast or drivers
7) One for one luminaire of up to 50 luminaires either per complete floor of the building or per complete tenant space, per annum

KEYED NOTES FOR EACH TYPE	
A	Reference Non-Residential & High-Rise Residential Indoor Areas Control Matrix. Indoor lighting system alteration are not required to separate EXISTING general, floor, wall or ornamental lighting on shared circuits or controls. Separate controls ONLY required for new or completely replaced lighting circuits.
B	Applicable ONLY for alterations to general lighting of enclosed spaces 100 sqft or larger and lighting load exceeds 0.5W/sqft. Reference Non-Residential & High-Rise Residential Indoor Areas Control Matrix.
C	Reference Non-Residential & High-Rise Residential Indoor Areas Control Matrix.
D	Reference Non-Residential & High-Rise Residential Indoor Areas Control Matrix.
R	Applicable ONLY when electrical power distribution systems is entirely new or a complete replacement. Reference Non-Residential & High-Rise Residential Indoor Areas Control Matrix.
E	Applicable ONLY for alterations where the installed lighting within this area/space is greater than 0.5W/sqft, and if this area (space) is larger than 10,000 sqft. Reference Non-Residential & High-Rise Residential Indoor Areas Control Matrix.

NON-RESIDENTIAL & HIGH-RISE RESIDENTIAL OUTDOOR APPLICATIONS	MINIMUM REQUIRED CONTROL TYPE			
	A	B	C	D
	Daylight Ability	Automatic Scheduling	Motion Sensor	Demand Response
OUTDOOR LIGHTING				
Outdoor lighting for Health / Life Safety Regulation	excepted			
Tunnel Lighting Required ON 24hrs/365days	excepted			
Outdoor Lighting per Special Applications listed on Section 140.7a ¹	A1	B1		
LUMINAIRES MOUNTED AT OR BELOW 24 FT				
Outdoor luminaire at 40 Watts or lower	A1	B1		
Outdoor luminaire more than 40 Watts	A1	B1	C1	
LUMINAIRES MOUNTED ABOVE 24 FT				
Outdoor luminaire at 40 Watts or lower	A1	B1		
Outdoor luminaire more than 40 Watts	A1	B1		
SIGN LIGHTING				
Indoor Sign	A2			
Outdoor Sign in tunnels/large covered areas required to be ON 24hrs/365days	A3			
Outdoor Sign that are ON both day & night	A4			
All other Outdoor Sign	A3			
Electronic Message Centers (EMC) over 15kW				D1

NOTES:

Luminaire Cut Off Requirements:

1. All outdoor luminaire of 6,200 initial luminaire lumens or greater shall comply with BUG requirements. Maximum zonal lumens for BUG in accordance with Title 24, Part 11 Section 5.106.8.
2. Except signs; lighting for building façade, public monuments, statues, vertical surface of bridge; lighting not permitted to be shut off for health and life safety regulations; temporary outdoor lighting; lighting for public roadways, sidewalks;

¹ Listed Special Applications Section 140.7a:

1. Temporary outdoor lighting.
2. Lighting required and regulated by the Federal Aviation Administration, and the Coast Guard.
3. Lighting for public streets, roadways, highways, and traffic signage lighting, including lighting for driveway entrances occurring in the public right-of-way.
4. Lighting for sports and athletic fields, and children's playgrounds.
5. Lighting for industrial sites, including but not limited to, rail yards, maritime shipyards and docks, piers and marinas, chemical and petroleum processing plants, and aviation facilities.
6. Lighting of public monuments.
7. Lighting of signs complying with the requirements of Sections 130.3 and 140.8
8. Lighting of stairs, wheelchair elevator lifts for American with Disabilities Act (ADA) compliance, and ramps that are other than parking garage ramps.
9. Landscape lighting.
10. In theme parks: outdoor lighting only for themes and special effects.
11. Lighting for outdoor theatrical and other outdoor live performances, provided that these lighting systems are additions to area lighting systems and are controlled by a multi-scene or theatrical cross-fade control station accessible only to authorized operators.
12. Outdoor lighting systems for qualified historic buildings, as defined in the California Historic Building Code (Title 24, Part 8), if they consist solely of historic lighting components or replicas of historic lighting components. If lighting systems for qualified historic buildings contain some historic lighting components or replicas of historic components, combined with other lighting components, only those historic or historic replica components are exempt. All other outdoor lighting systems for qualified historic buildings shall comply with Section 140.7.

KEYED NOTES FOR EACH SPACE/AREA TYPE

A	A1 REQUIRED. All outdoor lighting shall be controlled by a photocell, astronomical time-switch or other control capable of automatically shutting OFF outdoor lighting when daylight is available.
	A2 REQUIRED: Indoor Sign shall be controlled by Automatic time switch OR astronomical time switch control.
	A3 REQUIRED: Outdoor Sign shall be controlled by Automatic time switch with photocell OR astronomical time switch control.
	A4 REQUIRED. In addition to Automatic time switch with photocell OR astronomical time switch control. Outdoor sign lighting that is ON both day and night shall be controlled with a dimmer that provides the ability to automatically reduce sign lighting power by a minimum of 65% during nighttime hours. Signs that are illuminated at night and for more than 1-hour during daylight hours shall be considered ON both day and night. <i>EXCEPTION: Outdoor signs in tunnels and large covered areas that are intended to be illuminated both day and night.</i>
B	B1 REQUIRED. Automatic schedule that reduce lighting by 50% to 90% and separately turn OFF during scheduled unoccupied period. Allow minimum of two nighttime periods with independent lighting levels. May include override function that turns ON during its scheduled dim or OFF state for no more than 2-hours when an override is initiated.
C	C1 REQUIRED. Motion sensing controls capable of reducing lighting by at least 50% but no more than 90% and separately turn OFF during unoccupied period. (max. 15-min. time delay). Single sensor cannot control more than 1,500 watts of lighting.
D	D1 REQUIRED An Electronic Message Center (EMC) having a new connected lighting power load greater than 15 kW shall have a control installed that is capable of reducing the lighting power by a minimum of 30% when receiving a demand response signal. <i>EXCEPTION: Lighting for EMCs that is not permitted by a health or life safety statute, ordinance, or regulation to be reduced by 30%</i>

OUTDOOR LIGHTING QUICK TIPS

OPTION	APPROACH	MANUFACTURER & SERIES
Avoid Motion Sensor Requirement	< 40 Watts	<p>LITHONIA POLE HEADS RADEAN - Post Top P1, P2, P3 RADEAN - Arm Mount P1, P2, P3 D SERIES - DSX0 – Arm Mount P1 KAD LED - Arm Mount 20C</p> <p>MOST BOLLARDS</p> <p>MOST WALL PACKS</p>
Avoid BUG Rating Requirement	< 6200 Lumens	

In the 2019 Code, Allowed Outdoor LPD (watts/sf) have decreased 20% to

TABLE 140.7-A CEC 2019 TITLE 24 - OUTDOOR WATTAGE ALLOWANCES					
POWER ALLOWANCES	Lighting Zone 0	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
	Asphalt / Concrete	Asphalt / Concrete	Asphalt / Concrete	Asphalt / Concrete	Asphalt / Concrete
Area Wattage Allowance	No Allowance	0.018 W/sf	0.023 / 0.025 W/sf	0.025 / 0.03 W/sf	0.03 W/sf
Linear Wattage Allowance		0.15 W/Lf	0.17 / 0.4 W/Lf	0.25 / 0.4 W/Lf	0.35 W/Lf
Initial Wattage Allowance		180 W	250 W	350 W	400 W

RESIDENTIAL INDOOR DWELLING UNITS		MINIMUM CONTROL REQUIREMENTS PER AREA						
LIGHTING TYPE	JA8 * Required	Bathroom	Laundry Room	Utility Room	Small Closet	Hallway	Garage	All Other
HIGH-EFFICACY:								
All Ceiling Recessed Downlights	YES	A1	A1	A1	A3	A3	A1	A2
Screw-Base Lamps/Sources	YES	A1	A1	A1	A3	A3	A1	A2
Fluorescent—Pin-Based Linear or CFL Using Electronic Ballasts	NO	A1	A1	A1	A3	A3	A1	A3
Pulse-Start Metal Halide	NO	A1	A1	A1	A3	A3	A1	A3
High-Pressure Sodium	NO	A1	A1	A1	A3	A3	A1	A3
GU-24 Sockets (Non-LED)	NO	A1	A1	A1	A3	A3	A1	A3
GU-24 Sockets (LED)	YES	A1	A1	A1	A3	A3	A1	A2
Induction Lamps w/ High Frequency Generator	NO	A1	A1	A1	A3	A3	A1	A3
Inseparable SSL (e.g. LED) Luminaires w/ Colored Light Sources	NO	A1	A1	A1	A3	A3	A1	A3
Inseparable SLL (e.g. LED) Luminaires Installed Outdoors	NO	A1	A1	A1	A3	A3	A1	A3
Other Lighting Not Listed Above	YES	A1	A1	A1	A3	A3	A1	A2
Blank Electrical Boxes >5'A.F.F.	N/A							
NON-HIGH-EFFICACY: NOT PERMITTED ANYWHERE								
NOTES:								
*JOINT APPENDIX (JA8): https://cacertappliances.energy.ca.gov/Pages/ApplianceSearch.aspx								

KEYED NOTES FOR EACH SPACE/AREA TYPE	GENERAL NOTES FOR EACH CONTROL TYPE
<p>A1 REQUIRED. At least one luminaire shall be controlled by a vacancy sensor (manual ON/ auto off).</p>	<p>DIMMERS: All forward phase cut dimmers used with LED light sources shall comply with NEMA SSL 7A.</p> <p>SEPARATE CONTROL:</p> <ol style="list-style-type: none"> Undercabinet lighting shall be switched separately from other lighting systems. Exhaust fans shall be switched separately with lighting systems. <p>EXCEPTION: Lighting integral to an exhaust fan may be on the same switch as fan providing lighting can be switched while allowing fan to continue to operate for an extended period of time.</p>
<p>A2 REQUIRED. Dimmers or vacancy sensor shall control all luminaires required to be JA8 compliant.</p> <p>EXCEPTIONS:</p> <ol style="list-style-type: none"> Luminaires in closets <70 sqft. Luminaires in hallways. 	
<p>A3 REQUIRED: Luminaires shall be switched with readily accessible controls that permit the luminaires to be manually switched ON/OFF.</p>	

RESIDENTIAL OUTDOOR AREAS
SINGLE FAMILY
Lighting attached to residence or other buildings on the same lot must be high efficacy with one of these controls.
Manual ON/OFF Switch WITH:
a. PHOTOCELL AND MOTION SENSOR or
b. PHOTOCELL AND AUTO TIME SWITCH or
c. ASTRONOMICAL TIME CLOCK
LOW RISE (3 or less habitable stories)
Have the option of complying with either the residential or non-residential lighting standards for the following:
A) Private patios B) Entrances C) Balconies D) Porches

MANDATORY REQUIREMENTS
(T24 PART 6 SECTION 130)

This guide is intended to assist in your selection of lighting control products and equipment for commercial type projects based on the mandatory requirements set forth in California's Title 24 2019 Section 130.



PERFORMANCE APPROACH
(T24 PART 6 SECTION 140.1)

OR

PRESCRIPTIVE APPROACH
(T24 PART 6 SECTION 140.2)

In addition to the mandatory requirements, either a Performance or Prescriptive approach must be used to determine full compliance for lighting and control systems. Using either approach may result in changes to the required control products and equipment based on project specific lighting selections and

Let us support YOU! **16500** SUPPORTS YOUR LIGHTING AND LIGHTING CONTROL NEEDS:

Lighting Control Applications Engineering:

- ⇒ Product/system selection
- ⇒ Wiring diagrams
- ⇒ CAD Assistance
- ⇒ System Layouts
- ⇒ Quotations
- ⇒ Submittals
- ⇒ Fixture-integrated controls coordination
- ⇒ CALCTP-AT Certified Employer, Field Services, Programming/Product Technical Support

Lighting Applications Engineering:

- ⇒ Product selection and technical support
- ⇒ Product specific lighting illuminance & power density calculations
- ⇒ Lighting layouts
- ⇒ Quotations
- ⇒ Submittals

16500 offers this guide in a partnership effort with you, our clients and customers who participate in our electrical lighting and controls specifications, construction, and property ownership/management communities. We invite you to use the lighting control application guide as a tool that will assist with product and equipment selection.

TITLE 24 2019 NOTABLE CHANGES*

Indoor Lighting:

⇒ Reduced Indoor Lighting Power Allowances and Power adjustment factor (PAF) - Section 140.6

Indoor Lighting Controls:

- ⇒ Healthcare facilities under Building Occupancy Group I3 and I4 exempt from Title 24. Building Occupancy Group I-1 and I-2 Facilities (NOT EXEMPT) - Section 100.0
- ⇒ Occupancy sensing requirements for Restrooms. Restrooms exempt from multi-level controls. - Section 130.1 (b) & (c)
- ⇒ Additional exceptions to Daylighting – Section 130.1(d)
- ⇒ ADR to be either be certified OpenADR 2.0a or OpenADR 2.0b Virtual End Node (VEN). Allows alternative communication protocols as long as the system also uses one of the mandatory protocols: Wi-Fi, Zigbee, BACnet, Ethernet or hard-wiring. - Section 110.12
- ⇒ “Control Interactions” added to mandatory lighting controls section - Section 130.1f

Indoor Lighting Alterations:

- ⇒ New Requirements to indoor lighting system alterations for 10% or more luminaires in an enclosed space will need to meet one of the 3 options listed - Section 140.0(b)2I
- ⇒ New Exceptions to Alterations - Section 140.0(b)2I

Outdoor Lighting:

- ⇒ Reduced Outdoor Lighting Power Allowances and Power adjustment factor (PAF) - Section 140.7
- ⇒ All outdoor luminaires of 6,200 lumens or greater shall comply with BUG requirements – Section 130.2b

Outdoor Lighting Controls:

- ⇒ New Automatic scheduling requirements allow at least 50% of lighting to be turn OFF at night (but no more than 90%) and allow minimum of two nighttime periods with independent lighting levels. - Section 130.2(c)2
- ⇒ Motion sensors required all outdoor luminaires at or below 24 feet with more than 40 Watts. Motion sensors exempt for outdoor lighting 40 Watts or less - Section 130.2(c)3
- ⇒ Motions sensors capable of reducing outdoor lighting power by at least 50% but no more than 90% and separately turn OFF during unoccupied period (HIGH-LOW-OFF) - Section 130.2(c)3
- ⇒ Maximum motion sensor time delay 15 minutes. - Section 130.2(c)3

* Refer to the 2019 Title 24 Standards for further information on the Sections listed.

This Guide is for informational purposes only. Please refer to the 2019 Building Energy Standards website for more information.
<https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2019-building-energy-efficiency>