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CEC TITLE 20 & TITLE 24 SUMMARY

WHAT ARE THE CALIFORNIA “TITLES”

1. California Title 20

- **CEC Title 20 Appliance** ***Efficiency Regulations (2015),*** effective July 1, 2015.
- Establishes ***minimum*** performance standards for “appliances”, include lighting.
- All regulated appliances ***MUST*** be listed in CA database.

2. California Title 24, Part 6

- **CEC Title 24** ***Building Energy Efficiency Standards(2013),*** effective July 1, 2014.
- Establishes energy requirements for ***residential and non-residential*** buildings (new or major retrofit) in California.
- Any changes must be economically justified, be technically feasible, and save energy compared with the previous version.

TITLE 20 – APPLIANCE EFFIENCY STANDARDS

1. ***The current standards version is 2015*, were adopted on May 13, 2015, and are effective July 1, 2015.**
2. **http://www.energy.ca.gov/appliances/**
3. **LED Related:**
   - **Section 1602.** Definitions.

     (i) Self-contained Lighting controls

     ANO: Astronomical time-switch control

     ADC: Automatic daylight control

     ATS: Automatic time-switch control

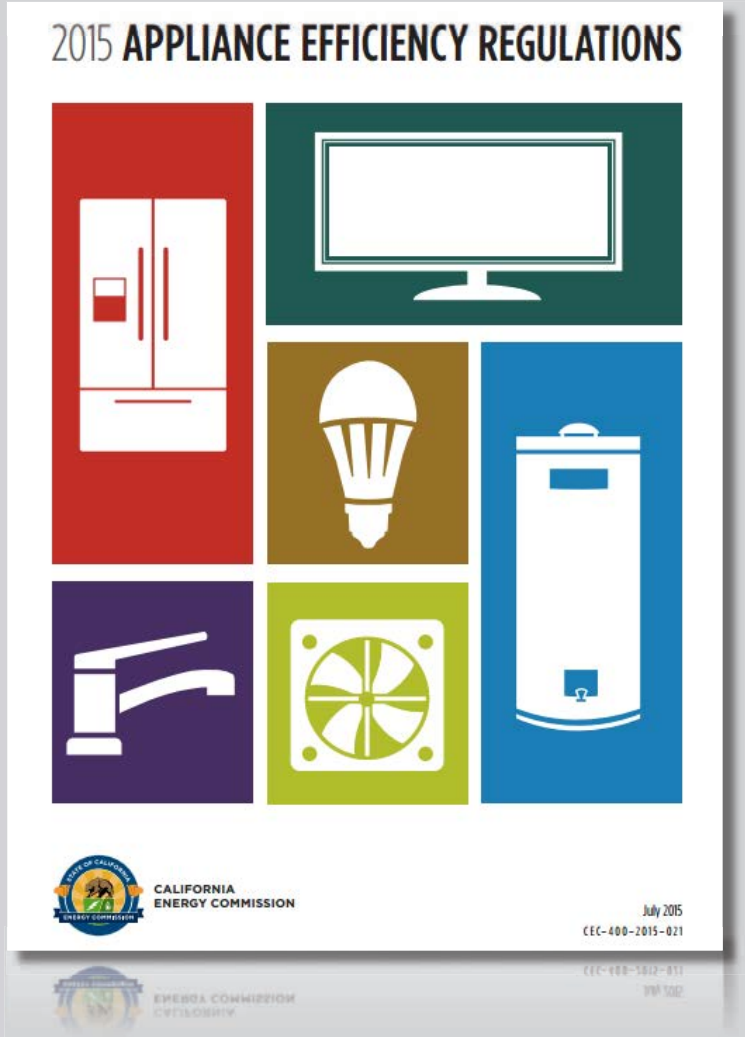
     OSD: Occupant Sensing Device

     Partial on/ Partial off

     Motion/Occupancy/Vacancy sensor

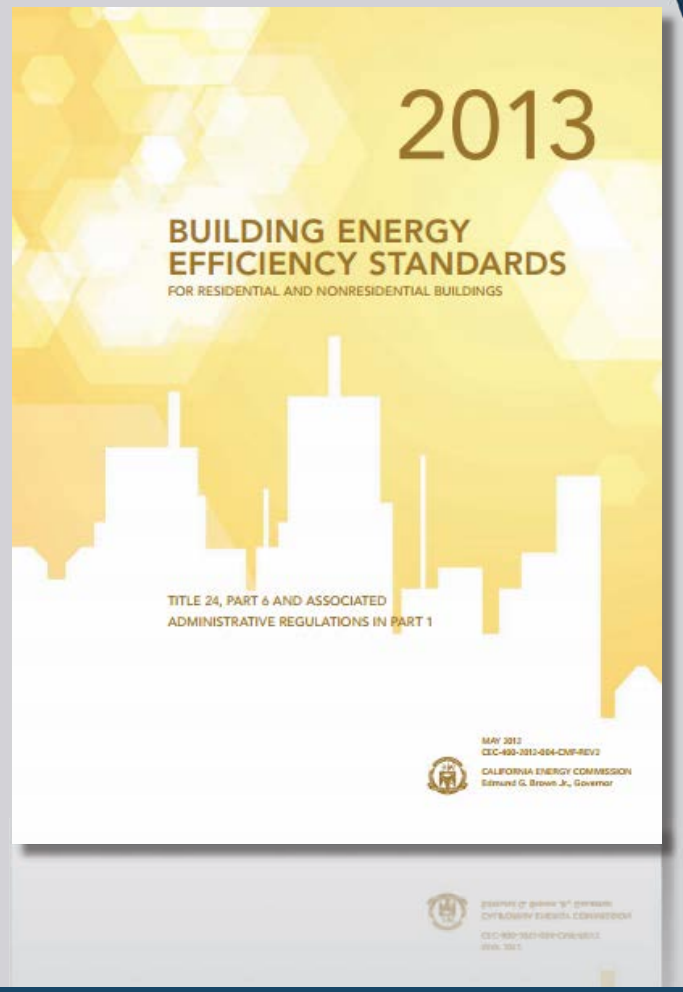
     PCD: Photo control

     (n) Luminaires
   - **Section 1605.3 State standards**



TITLE 24 – BUILDING ENERGY EFFICIENCY STANDARDS

1. **The current standards is 2013 version, went into effect July 1, 2014**
2. **http://www.energy.ca.gov/title24/2013standards/**
3. **General Requirements:**
   - **Sect. 110.9** – Mandatory requirements for LC
   - **Sect. 130.0** – general requirements for interior lighting
   - **Sect. 130.4** – Lighting Control Acceptance & Certificate Requirements
4. **Outdoor Title 24:**
   - **Sect. 10-114** – Determination of outdoor lighting zones
   - **Sect. 130.2** – Outdoor lighting controls & equipment
   - **Sect. 140.7** – Requirement for outdoor lighting
5. **Indoor Title 24:**
   - **Sect. 130.1** – Indoor lighting controls
     a) Area **b)** Multi-level **c)** Shut-off **d)** ADC **e)** DR
   - **Sect. 140.6** – Indoor lighting
   - **Sect. 150.0(k)** – High efficacy Luminares
7. **Not a fixture qualification system,** no Title–24 qualified products, but projects T24 compliant fixtures help project qualification.



TITLE 24 – GENERAL REQUIREMENTS

1. **Sect. 110.9 – Mandatory requirements for lighting control devices:**
   a) Meet Title20 requirements
   b) Lighting control systems meet Sect130.0-130.5, 140.6~140.8, 141.0, 150.0(K)
2. **Sect. 130.0 – General Requirements:**
   a) Must comply with Sect. 130.0 -130.5 , except b)
   b) Functional areas comply with Sect.150.0(k), common areas comply with non-residential lighting standards
      1.) High-rise residential dwelling units.
      2.) Outdoor lighting that is attached to a high-rise residential or hotel/motel building, and is separately controlled from the inside of a dwelling unit or guest room.
      3.) Fire station dwelling accommodations.
      4.) Hotel and motel guest rooms.
      5.) Dormitory and Senior housing dwelling accommodations.
   c) Luminaire classification and power (Wattage and Labeling)
3. **Sect. 130.4 – Lighting control acceptance and installation certificate requirements**

TITLE 24 – OUTDOOR REQUIREMENTS

1. **Sect. 130.2 – Outdoor lighting controls & equipment**
   - b) **Cutoff requirements:** "BUG" req. if >150W
   - c) **Controls:** see table of next slide for detail
     - ✓ Auto-OFF when daylight by PC or ANO
     - ✓ Be circuited and independently controlled
     - ✓ ≤24' ,or Outdoor Sales/façade
       - Motion sensor control when area is unoccupied ➔ 40%~80 , Auto-ON function
       - Using Bi-level or continuous dimming
       - **Exclusions:** low power
     - ✓ >24', PC or ANO at least
     - ✓ Exclusions: health or life safety, tunnels
2. **Sect. 140.7- Requirements for outdoor lighting (Area Wattage)**

TITLE 24 – OUTDOOR KEY POINT

APPLICATION	REQUIREMENT	DETAIL	SOLUTION
All	Controls	Auto-off by photo control or astronomical time-switch control	PC or ANO
		Circuited and independently controlled	
≤24'above ground	Controls	Motion sensor or system automatically controls reduce 40%~80% when vacated. Auto-on when occupied.	MSDIM
		Using Bi-level or continuous dimming.	
		≤1500W controlled together.	
	Exclusion	Pole mount luminaires Pmax≤75W	PC or ANO
		Non-Pole mount luminaires Pmax≤30W	
		Linear lighting Pmax ≤ 4W/LF(linear foot)	
Outdoor Sales Frontage, LOTS, Canopies	Controls	Part-night control, or	ANO
		Motion sensor or system automatically controls reduce 40%~80% when vacated. Auto-on when occupied.	MSDIM
Façade, ornamental, hardscape, Outdoor dining	Controls	Part-night control	ANO
		Motion sensor or system automatically controls reduce 40%~80% when vacated. Auto-on when occupied	MSDIM
		Centralized time-based zone control, automatically reduce power ≥ 50%	ATS(+DIM)
	Exclusion	Wall pack ≤24'fellows "≤24'rule"	MSDIM
any >24'above ground	Controls	No requirements besides PC or ANO	PC or ANO

MSDIM or Bi-Level solution suite for all products

TITLE 24 – OUTDOOR FIXTURES, COMPLIANT EXAMPLES

FIXTURES	POWER	CONTROL	TITLE – 24 COMPLIANT
AR & Street	150W D10	PC	Mounted >24 feet require only a photocell.
	150W D10	MSDIM	Pole-mounted fixture > 75 Watts mounted ≤24 feet when used with a photo/motion control. Dim or bi-Level.
Flood	26W	PC	Non-pole-mounted fixture < 30 Watts
	78W	PC	Mounted >24 feet require only a photocell.
	78W D10	MSDIM	Non-pole-mounted fixture > 30 Watts mounted ≤24 feet when used with a photo/motion control. Dim or bi-Level.
WallPack	12W	PC	Non-pole-mounted fixture < 30 Watts
	52W	PC	Mounted >24 feet require only a photocell.
	52W D10	MSDIM	Pole-mounted fixture > 30 Watts, mounted ≤24 feet when used with a photo/motion control. Dim or bi-Level.

TITLE 24 – INDOOR REQUIREMENTS

1. **Sect. 130.1 – Indoor lighting controls**
   1) Area controls
   2) Multi-level controls
   3) Shut-off controls
   4) Automatic daylighting controls
   5) Demand responsive controls
2. **Sect.140.6 – Indoor lighting**
3. **Sect.150.0 (K) – High Efficacy Luminaires**

TITLE 24 – INDOOR KEY POINT (1)

CONTROLS	CONDITION	REQUIREMENT	SOLUTION
(a) Area Control	**All luminaires indoor. Exception:** <0.2W/SF emergency egress	Manual ON/OFF	**Manual Switch**
		Each area enclosed by ceiling-height partitions independently controlled.	
	Dimmable luminaires	Dimmer switch shall allow manual ON and OFF, and dim per 130.1(b) required.	**Dimmer Switch**
	Other Lighting control	Shall not override area control	
	General lighting; floor and wall display, window display etc.; track lighting	General lighting; floor and wall display, window display etc.; track lighting shall each be separately controlled.	
(b) Multi-level Lighting Control	**Enclosed area** ≥ 100SF, load >0.5/SF	Requires number of control steps per Table 130.1-A. LED 10%~100%	**Dimmer Lumen Maintenance Tuning ADC DRC**
		Multi-level controls shall not override AR, shut-OFF, DR control	
		At least one of following methods: - Manual dimming - Lumen maintenance - Tuning - Automatic day lighting controls - Demand responsive lighting controls	
	Exception	Classroom, load ≤0.7 W/SF, one control step between 30-70% of full power	
		An enclosed area, only one luminaire ≤ 2 lamps	
(c) Shutt-OFF Control	**All indoor lighting in addition to:** (a)AR and (b)MLC	**Shutting OFF all lighting by one of following:** - OSD: occupant sensing control - ATS: automatic time-switch control - BA: another building system or other control	**OSD ATS Gateway**
	Exception	Many areas meet requirements of 130.1(c)1-8	

TITLE 24 – INDOOR KEY POINT (2)

CONTROLS	CONDITION	REQUIREMENT	SOLUTION
(d) Automatic Daylight Control	**Daylit Zone:** - SDZ: Skylit Daylit **Zone:** - **PSDZ**: Primary Slidelit Daylit Zone - **SSDZ:** Secondary **Slidelit Daylit Zone**	SDZ and/or PSDZ controlled independently but fully functional ADC.	PCDIM
		Photo sensors, and calibration not accessible to unauthorized people.	
		Shall provide multilevel lighting per Table 130.1-A, 10-100% as LED.	
		Combined illuminance from controlled lighting and daylight shall ≥controlled lighting with no daylight.	
		When daylight illuminance > 150% of design illuminance at full power, the general lighting power in daylit zone shall be reduced by minimum 65%.	
	Exception	**Some special areas meet requirements:** - SDZ and PSDZ power >120W - rooms glazing area <24SF - garages per 130.1(d)3 - etc…	
		Power density <0.3W/SF not require multilevel lighting control.	
(e) Demand Responsive Control	**Power>10,000 SF**	Shall response Demand Response Signal	
	Exception	Automatically lower power by a minimum of 15% full power per DR signal	

TITLE 24 – INDOOR FIXTURES, COMPLIANT EXAMPLES

FIXTURES	CONTROL	TITLE – 24 COMPLIANT
High bay	**D10**	As a commercial indoor fixture for corridors, stairwells, warehouses and covered parking garages when used with a multi-level occupancy sensor.
	OccDim[1]	As commercial indoor fixtures for corridors, stairwells, warehouses and covered parking garages , integrated with multi-level occupancy sensor.
Garage	**D10**	As a commercial indoor fixture for corridors, stairwells, warehouses and covered parking garages when used with a multi-level occupancy sensor. Per 130.1(c)7(Shut-OFF) and (d).3 (ADC)
	OccDim	As commercial indoor fixtures for corridors, stairwells, warehouses and covered parking garages , integrated with multi-level occupancy sensor. Per 130.1(c)7(Shut-OFF) and (d).3 (ADC)
Canopy	**D10**	As a commercial indoor fixture for general spaces when used with a occupancy sensor and 0-10V dimming control.
Traffers or Panel	**D10**	As a commercial indoor fixture for general spaces when used with a occupancy sensor and 0-10V dimming control.
Panel	**D10**	As a commercial indoor fixture for general spaces when used with a occupancy sensor and 0-10V dimming control.
Lenear light	**D10**	As a commercial indoor fixture for general spaces when used with a occupancy sensor and 0-10V dimming control.
Downlight	**D10**	As a commercial indoor fixture for general spaces when used with a occupancy sensor and 0-10V dimming control.
	TRIAC	As a commercial indoor fixture for general spaces when used with a occupancy sensor and compatible TRIAC dimming control.

Note1: occupant sensing devices is called occupancy sensor for indoor application and motion sensor for outdoor application.

TITLE 2 & TITLE 24 – SUMMARY

- **Title – 20:** All regulated appliances *(Self-contained Lighting controls)* **MUST** be listed.
- **Title – 24 Outdoor:**
  - All can be auto-off by photo control or astronomical time-switch control
  - Circuited and independently controlled
  - Auto-on when occupied using Bi-level or continuous dimming.
  - Some small power fixtures do NOT require motion sensor, but PC
- **Title – 24 Indoor:**
  - **5 types of control depends on area size and application:**
    - Area control: ***All luminaires*** indoor shall be controlled with manual ON/OFF
    - **Multi-level lighting control:** enclosed are ≥ 100 square feet.
    - **Shut-OFF:** in addition to AR control and ML control, controlled by Occupant sensing control, automatic time-switch control, or signal from BAS.
    - **Automatic Day lighting control:** daylit zone required daylighting multi-level control.
    - **Demand Responsive Control:** >10,000 square feet requires.
    - Each control has some **exception** conditions.
  - **4 Common Control Solutions:**

    1) Manual ON/OFF, **2)** Occ, **3)** ON/OFF + D10, **4)** OccDim

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THANK YOU.

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