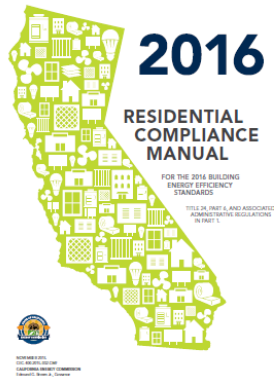


Residential Requirements



Under T24 Commercial Rules, CEC dictates power requirements, but doesn't care about the fixtures used.

Under T24 Residential Rules, CEC doesn't limit power used, but wants High Efficacy Fixtures.

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A pdf copy of the complete presentation is available at:

http://bit.ly/2016T24r1_Res

§150.0(k)1A-B: Low-rise Residential Buildings

Residential Lighting

- Per Table 150.0-A ~~and 150.0-B~~, Luminaires are **either**
 - High Efficiency
 - ~~Low Efficiency~~
- ~~If it's a hybrid Luminaire with both High and Low Efficiency systems, each separately complies with 150.0(k) requirements~~

§150.0(k)1: Low-rise Residential Buildings

Residential Lighting

TABLE 150.0-A CLASSIFICATION OF HIGH EFFICACY LIGHT SOURCES

High Efficacy Light Sources	
Luminaires installed with only the lighting technologies in this table shall be classified as high efficacy	
Light sources in this column other than those installed in ceiling recessed downlight luminaires are classified as high efficacy and are not required to comply with Reference Joint Appendix JA8	Light sources in this column shall be certified to the Commission as High Efficacy Light Sources in accordance with Reference Joint Appendix JA8 and be marked as meeting JA8.
<ol style="list-style-type: none"> Pin-based linear or compact fluorescent light sources using electronic ballasts. Pulse-start metal halide. High pressure sodium. GU-24 sockets containing light sources other than LEDs.^{a,b} Luminaires with hardwired high frequency generator and induction lamp. Inseparable SSL luminaires that are installed outdoors. Inseparable SSL luminaires containing colored light sources that are installed to provide decorative lighting. 	<ol style="list-style-type: none"> All light sources in ceiling recessed downlight luminaires. Note that ceiling recessed downlight luminaires shall not have screw bases regardless of lamp type as described in Section 150.0(k)1C. GU-24 sockets containing LED light sources. Any light source not otherwise listed in this table and certified to the Commission as complying with Joint Appendix 8.
Notes: a. GU-24 sockets containing light sources such as compact fluorescent lamps and induction lamps. b. California Title 20 Section 1605(k)3 does not allow incandescent sources to have a GU-24 base.	

152

§110.9 (e): Mandatory Requirements for Lighting Control Devices

LEDs in Resi Applications

- To be a JA-8 High Efficacy light source, Resi ~~LED Luminaires and Light Engines~~ CA High Quality, High Efficacy light sources shall be certified to CEC per JA-8 ~~if not certified, considered Low Efficacy~~
- Mandates ~~<3,000°K for interior, 2700-5000°K for exterior.~~
 - Non-resi LED light sources not required to be certified to the CEC
 - Color changing lamps capable of providing light outside of the shall also be able to meet all of the requirements in this section when tested within the defined chromaticity ranges.
- Minimum LED CRI of 90 when tested at CCT ≤ 3000K ~~(Note this not the case for exterior LEDs)~~
 - Provide color rendering R9 value (red) ≥ 50 at a CCT ≤ 3000°K.
 - Dimmable down to 10%
 - No noise above 24dBA at 100% and 20% of full light output.
 - "Reduced flicker operation" at 100% and 20% of full light output
 - Start time no less than 0.3 seconds
 - At 45°C, maintain ≥ 90% of initial light output (total luminous flux) at 25°C
 - Minimum rated lifetime of 15,000 hrs.
 - Minimum percentage of 0-hour light output after a 6,000 hour test must be 86.7%.
 - 9 out of 10 tested units shall be operational at 3,000 hours.
 - Five year manufacturer warranty (based on 1 200 h/yr)

155

§110.9 (e): Mandatory Requirements for Lighting Control Devices

LEDs in Resi Applications

- Maximum rated input wattage, total luminous flux, CCT, and CRI to be listed on a permanent, pre-printed, factory-installed label on the light source circuit board, light engine, or luminaire light source housing.
 - Product shall contain marking indicating “CA JA8 Compliant.”
 - Product shall contain a marking with the date of manufacture “Date of Manuf: MM/YYYY”
- LED-based lamps, luminaires, or light engines shall meet the requirements of NEMA’s standard SSL7A as Type 1 or Type 2 products.
- Table JA-8 High Efficacy Qualification Requirements:

Lamp Power Rating	Min. Lamp Efficacy
5 watts or less	30 lumens per watt
Over 5 - 15 watts	45 lumens per watt
Over 15 watts to 40 Watts	60 lumens per watt
Over 40 watts	90 lumens per watt

156

§150.0(k)1C-F : Low-rise Residential Buildings

Luminaire Requirements

- **Blank Electrical Boxes**
 - # Empty electrical boxes > 5' above the floor shall be ≤ # of bedrooms, and must be served by a dimmer, vacancy sensor, or fan speed control.
 - In kitchens electrical boxes with a blank cover or where no electrical equipment is installed is **180 watts of low efficacy lighting** per electrical box
- **Luminaire Wattage**
 - Permanently installed luminaries wattage per Section 130.0(e)
- **Electronic Ballasts**
 - For all Fluorescent lamps over 13W, with output freq > 20kHz
- **Nightlights Alone**
 - Rated to consume no more than 5 watts of power per Luminaire or Fan
 - Not required to be controlled by a vacancy sensor
- **Exhaust Fan Lighting**
 - In all rooms ~~except kitchens~~ must comply to Section 150 (k)
 - Except for Lighting installed by manufacturer in Kitchen Exhaust Hoods



157

§150.0(k)1C-F : Low-rise Residential Buildings

Recessed Luminaire Requirements

- Recessed Downlight luminaires in Ceilings
Luminaires recessed into ceilings shall:
 - Be listed for zero clearance insulation contact (IC) by UL or other testing lab; and
 - Have label certifying the luminaire is airtight ; and
 - Air leakage < 2.0 CFM at 75 Pascals per ASTM E283
 - Exhaust fan housings shall not be required to be certified airtight
 - Be sealed with a gasket/caulk between the luminaire housing and ceiling AND at any air leak paths between conditioned and unconditioned spaces; and
 - ~~For recessed compact fluorescent luminaires with ballasts to qualify as high efficacy for compliance with Section 150.0(k), the ballasts shall be certified to the Commission to comply with the applicable requirements in Section 110.9;~~
 - For luminaires with hardwired ballasts or drivers, allow ballast /driver maintenance and replacement to be readily accessible to occupants from below the ceiling without requiring the cutting of holes in the ceiling; and
 - Shall not contain screw base sockets; and
 - Shall contain light sources that meet JA8, including the elevated temperature requirements, and are marked "JA8-2016-E"

158

§150.0(k)1C-F : Low-rise Residential Buildings

Screw Based Luminaire Requirements

- Screw based luminaires shall meet all the following:
 - The luminaires shall not be recessed downlight luminaires in ceilings; and
 - The luminaires shall contain lamps that comply with Reference Joint Appendix JA8; and
 - Installed lamps shall be labeled marked with "JA8-2016" or "JA8-2016-E" as compliant with specified in Reference Joint Appendix JA8.
 - EXCEPTION: Luminaires with hard-wired ballasts for high intensity discharge lamps.
- Enclosed Luminaires.
Light sources that are not marked "JA8-2016-E" shall not be installed in enclosed luminaires.

159

§150.0(k)2 : Low-rise Residential Buildings

Switching Devices & Controls

- All leading edge/forward phase cut dimmers used with LED light sources shall meet NEMA SSL 7A
- Switch Exhaust fans separately from lighting
 - EXCEPTION Lighting integral to exhaust fans may be on the same switch as the fan provided the lighting can be switched OFF in accordance with the applicable provisions in Section 150.0(k)2 while allowing the fan to continue to operate for a period of time.
- Luminaires must have readily accessible manual controls capable of On / Off
- Lighting Controls must be installed in accordance with the manufacturer's instructions
- Luminaires cannot have controls that bypass any required dimmer or vacancy sensor
- An Energy Management Control System and/or multi-scene programmable controller may be used if it complies with Dimming or Vacancy Sensor requirements.

160

§150.0(k)4-7 : Low-rise Residential Buildings

Lighting Specific to rooms

- **Bathrooms, Garages, Laundry Rooms, and Utility Rooms:** At least one luminaire must be controlled by a Vacancy Sensor
- **Dimmers or Vacancy Sensors** shall control all luminaires required to have light sources compliant with JA8
 - Luminaires in Closets < 70 ft² exempted
 - Luminaires in Hallways exempted
- **Undercabinet Lighting must be switched separately from all other lighting systems**
- ~~**Internal Cabinet Lighting:** ≤ 20 W/ linear ft.
Regardless of the number of shelves or the number of doors per cabinet section, the length of an illuminated cabinet shall be determined by:
 - One horizontal length of illuminated cabinet; or
 - One vertical length, per illuminated cabinet section; or
 - No more than one vertical length per every 40 horizontal inches of illuminated cabinet.~~



§150.0(k)3 : Low-rise Residential Buildings

Lighting Specific to rooms

- **Kitchens:** $\geq 50\%$ of permanently installed lighting must be high efficacy (by Watts)
- Exemption for:
 - 50W for dwelling units $\leq 2,500$ ft², or
 - 100W for dwelling units $> 2,500$ ft² if:
 - **Meet 150.0(k)2 and low efficacy all kitchen luminaires are controlled by a vacancy sensor or dimmer, EMCS, or programmable control system, AND**
 - All permanently installed lights in garages, laundry rooms, closets > 70 ft², and utility rooms are high efficacy **AND** controlled by a vacancy sensor (Note bathrooms are not included in list).



162

§150.0(k)3A : Low-rise Residential Buildings

Resi Outdoor Lighting

- All Outdoor Resi Lighting Luminaires must be High Efficacy per TABLE 150.0-A
- For **Single Family Resi Buildings**, outdoor luminaires permanently attached to buildings on the lot must have a Manual on/off switch (that doesn't bypass below controls by forcing lights on), and either
 - Photocell and Motion sensor*, or
 - Photocontrol or Automatic time switch*, or
 - Astronomic time clock*, or
 - EMCS not having override/bypass acting as an Astro time clock



* Can have ON override control if it resets automatically within 6 hrs

§150.0(k)3B-D: Other Residential Lighting Notes

Low-Rise Resi – Other Requirements

- **Low-rise multifamily resi buildings:** Outdoor lighting for private patios, entrances, balconies, porches and parking lots/carpports (with <8 vehicles per site) shall comply with one of the following requirements:
 - i. Single Family Resi Building outdoor lighting §150.0(k)3A; or
 - ii. Non-resi §110.9, 130.0, 130.2, 130.4, 140.7 and 141.0
- **Low-rise resi buildings with ≥ 4 dwelling units:** Outdoor lighting not regulated by §150.0(k)3B (*above*) or 150.0(k)3D (*below*) should comply with Non-resi §110.9, 130.0, 130.2, 130.4, 140.7 and 141.0
- Outdoor lighting for **resi parking lots / carpports with ≥ 8 vehicles** per site follows non-resi §110.9, 130.0, 130.2, 130.4, 140.7 and 141.0

164

§150.0(k)4-6: Other Residential Lighting Notes

Low-Rise Resi – Other Requirements

- Internally illuminated address signs shall:
 - Comply with §140.8 (Non-Resi Sign Requirements); or
 - Use <5 watts of power per §130.0(c).
- **Lighting in Resi parking garages for ≥ 8 Vehicles** should meet nonresidential garages requirements
 - §110.9, 130.0, 130.1, 130.4, 140.6, and 141.0.
- Interior Common Areas of **Low-rise Multi-Family Resi Buildings**
 - If Total interior common area in a single building is ≤ 20% of the floor area, permanently installed lighting in interior common areas should be **high efficacy luminaires and controlled by an occupant sensor**.
 - If Total interior common area in a single building is > 20% of the floor area, permanently installed lighting in that building shall:
 - Comply with §110.9, 130.0, 130.1, 140.6 and 141.0; and
 - Corridor and stairwell lighting to be controlled by **occupant sensors that reduce the lighting power in each space by at least 50 percent**. The occupant sensors shall be capable of turning the light fully On and Off from all designed paths of ingress and egress.

165

§150.0(k)

Summary of Primary Resi Impacts

- Any type of lamp or light source can be tested against the JA-8 specs to see if it's considered High Efficacy
- Downlights must be JA-8 compliant, and can't use screw based lamps
 - Can use integral downlight luminaires, or use quick-connect, Zhaga or GU-24 base.
- Other luminaire / luminaire base type can be classified as a high efficacy luminaire, provided it has a JA-8 Light Source installed at the time of inspection.
 - Medium screw base, GU5.3, GU10, Candelabra base, Zhaga, or hard wired integral luminaire
- GU-24, linear fluorescent, HID and dedicated outdoor luminaires can comply with Section 150.0(k) without being JA-8 compliant

Title 24 Resources



- <http://www.energy.ca.gov/title24>
 - Energy Efficiency Standards
 - Compliance Manual
- Hotline: 800-772-3300
- Blueprint
 - <http://www.energy.ca.gov/efficiency/blueprint/>
- CLTC
 - [Commercial Guide](#)
 - [Resi Guide](#)

California Energy Commission Energy Standards Hotline

(916) 654-5106
or toll free in California
(800) 772-3300

HOURS:
Monday through Friday
8 a.m. to 12 p.m. and 1 p.m. to 4:30 p.m.

E-mail: title24@energy.state.ca.us



Questions???

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Thank you

What are your questions?

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