



CALIFORNIA ENERGY COMMISSION

Changes for California 2008 Title 24 Lighting Standards



Title 20 Appliance Efficiency Regulations





Title 20 Scope

- New appliances sold or offered for sale in California
EXCEPT:
 - Sold wholesale in California for final retail sale outside the state
 - Designed and sold exclusively for use in recreational vehicles or other mobile equipment.
- Applies to units manufactured on or after the effective date of the provision
- Must be certified to the Energy Commission



T-20 General Service Incandescent Lamps

Common Wattages = 5% lower

Pre-T20 Wattage	January 2008 Wattage
100	95
75	71
60	57
40	38





T20 General Service Lamps

Equivalent lumen output compared to old rated wattage lamp	Maximum rated Wattage	Minimum Rated Life Time	Proposed California Effective Date
100 Watts	72 Watts	1,000 hours	Jan, 1, 2011
75 Watts	53 Watts	1,000 hours	Jan 1, 2012
60 Watts	43 Watts	1,000 hours	Jan 1, 2013
40 Watts	29 Watts	1,000 hours	Jan 1, 2013

Lumens Range	Maximum Lamp Efficacy	Minimum Rated Life Time	Proposed California Effective Date
All	45 lumens per watt	1,000 hours	Jan, 1, 2018



Title 20 Appliance Efficiency Regulations Metal Halide Luminaires

- January 2006 California “Tier 1”
- January 2008 California “Tier 2”
- January 2009 Federal Regulations
- January 2010 California



Title 20 Appliance Efficiency Regulations Metal Halide Luminaires

Metal halide luminaires rated for 150 to 500 watts, manufactured on or after January 2010 through January 2015

Menu of compliance options

- High efficiency ballast
- Moderate efficiency ballast + integral controls
- Moderate efficiency ballast + non-conventional wattages
- Moderate efficiency ballast + prepackaged & sold with high efficiency lamp (this option only available 336 through 500 watt lamps)



CALIFORNIA ENERGY COMMISSION

Title 24 - 2008 General Information



2008 Title 24

Adopted

- April 23, 2008

Effective

- January 1, 2010
 - For building permits filed on or after January 1, 2010



2008 Title 24

Documents are available on-line

www.energy.ca.gov

- Efficiency
 - Building Efficiency Standards (Title 24)
 - 2008 Standards

- *Standards*
- *Compliance Manuals (Residential and Nonresidential)*
- *Appendices*
- *ACM*



§ 101 Definitions

- Many new definitions added
- Clarifications made to existing definitions
- Many T24 inquiries are answered by taking folks to the definition section



DEFINITIONS § 101

Permanently Installed Lighting

2005

2008

All luminaires attached to the inside or outside of a building or site, including:

- Track and flexible lighting system
- Attached to walls, ceilings, columns
- Inside or outside of permanently installed cabinets
- Internally illuminated case work
- Mounted on poles, in trees or in the ground
- Attached to ceiling fans
- Integral to exhaust fans that are other than exhaust hoods for cooking equipment

(continued on next page)



DEFINITIONS § 101

Permanently Installed Lighting

(continued from previous page)

2005

2008

- **May have either plug-in or hardwired connections for electric power**
- Does not include
 - Portable lighting
 - Lighting installed by the manufacturer in refrigerators, stoves, microwave ovens, exhaust hoods for cooking equipment, refrigerated cases, vending machines, food preparation equipment, and scientific and industrial equipment.



DEFINITIONS § 101

Portable Lighting	
2005	2008
	<ul style="list-style-type: none">• Lighting with plug-in connections for electric power that is<ul style="list-style-type: none">• Table lamps• Freestanding floor lamps• Attached to modular furniture• Workstation task lights• Lights attached to workstation panels, movable displays• Other lighting that is not permanently installed lighting.



DEFINITIONS § 101

Temporary Lighting	
2005	2008
<ul style="list-style-type: none">• Temporary connections, such as cord and plug, are used for electric power	<ul style="list-style-type: none">• With plug-in connections
<ul style="list-style-type: none">• Does not persist beyond 60 consecutive days or more than 120 days per year.	



DEFINITIONS § 101 (Residential Space Type)

2005	2008
<ul style="list-style-type: none">Bathroom is a room containing a shower, tub, toilet or sink used for personal hygiene.	<ul style="list-style-type: none">Bathroom is a room or area containing a sink used for personal hygiene, toilet, shower, or a tub.
	<ul style="list-style-type: none">Closet is a non-habitable room used for the storage of linens, household supplies, clothing, non-perishable food, or similar uses, and which is not a hallway or passageway.



DEFINITIONS § 101 (Residential Space Type)

2005	2008
	<ul style="list-style-type: none">• Laundry is a non-habitable room or space which contains plumbing and electrical connections for a washing machine or clothes dryer.
	<ul style="list-style-type: none">• Storage Building is a non-habitable detached building used for the storage of tools, garden equipment, or miscellaneous items.
	<ul style="list-style-type: none">• Utility Room is a non-habitable room or building which contains only HVAC, plumbing, or electrical controls or equipment; and which is not a bathroom, closet, garage, or laundry room.



DEFINITIONS § 101 (Residential Space Type)

2005	2008
Low-Rise Residential Building	
Is a building, other than a hotel/motel that is of Occupancy Group R, Division I, and is multi-family with three stories or less, or that is of Occupancy Group R, Division 3	Is a building, other than a hotel/motel that is of Occupancy Group R, division I, and is multi-family with three stories or less, or a single family residence of Occupancy Group R, Division 3, or an Occupancy Group U building located on a residential site



DEFINITIONS § 101 (Residential Space Type)

2005	2008
	<ul style="list-style-type: none">Garage is a non-habitable building or portion of building, attached to or detached from a residential dwelling unit, in which motor vehicles are parked.
<ul style="list-style-type: none">Kitchen is a room or area used for cooking, food storage and preparation and washing dishes, including associated counter tops and cabinets, refrigerator, stove, ovens, and floor area.	



Luminaire Efficacy and Wattage is NOT based on the initial lamp installed

Based on Rating of the Socket

- Luminaire input wattage is based upon the type and rating of the luminaire, not the type of lamp initially installed in a luminaire
- A high efficacy lamp screwed into a low efficacy luminaire is still be considered to be a low efficacy lighting system for Title 24 projects



Rules for Determining Wattage §130(d)

Luminaire wattage shall be determined as follows...

...or by a method approved by the Executive Director

Therefore, supplemental information in Compliance Manuals is relevant.



Rules for Determining Wattage §130(d)

Line-Voltage Incandescent Luminaires

- Line voltage lamp holders & no ballasts or transformers
- Other than GU-24
- Other than recessed

Rules to determine wattage:

- Maximum relamping rated wattage as listed on a permanent, **pre-printed**, factory-installed label





Rules for Determining Wattage §130(d)

Line-Voltage Incandescent Luminaires - continued

For RECESSED luminaires with screw-base line-voltage lamp holders shall be the larger of

- Relamping rated wattage, or
- 50 watts per socket for $< 5''$ aperture diameter regardless of mounting height
- 50 watts per socket for $\geq 5''$ aperture diameter and mounting height ≤ 11 feet
- 60 watts per socket for $\geq 5''$ aperture diameter and mounting height > 11 and < 15 feet
- 75 watts per socket for $\geq 5''$ aperture diameter and mounting height ≥ 15 feet





Rules for Determining Wattage §130(d)

Modular Luminaires

- Luminaires designed to accommodate a variety of trims without changing wiring shall be highest wattage designated by the correlated marking
- Line voltage: **Label shall not consist of peel-off or peel-down layers**





Rules for Determining Wattage §130(d)

Ballasts

- Permanently / remotely installed ballasts = operating input wattage of the rated lamp/ballast combination published in manufacturer's catalogs based on independent testing lab reports as specified by UL 1598
- CFL or HID luminaires that accommodate a range of wattages without changing the luminaire housing, ballast, or wiring shall be the larger of the installed lamp/ballast combination, or the average lamp/ballast combination for which the luminaire is rated.

1	26	50/10	120	REZ-1T42-M2-XX①②	✓	✓	0.26	31/8	1.00/ 0.05	10	0.98	Size 2/ 168
			277	VEZ-1T42-M2-XX①②	✓	✓	0.11					
2	26	50/10	120	REZ-2Q26-M2-XX①②	✓	✓	0.48	58/16	1.00/ 0.05	10	0.98	Size 2/ 168
			277	VEZ-2Q26-M2-XX①②	✓	✓	0.21					



Rules for Determining Wattage §130(d)

EXAMPLE: Multi-Wattage CFL Ballasts

Use higher of:

- Installed wattage, or
- Average wattage

Lamp Wattage

- 26
- 32
- 42

If 26 or 32 Watt lamps installed:

- Use average = 33.3 Watts

If 42 watt lamp installed:

- Use 42 Watts



Rules for Determining Wattage §130(d)

Line-voltage Track and Plug-in Busway

Rated > 20 Amperes

- VA rating of the branch circuit. (*only option available for > 20 ampere*)





Rules for Determining Wattage §130(d)

Line-voltage Track and Plug-in Busway

Rated for 20 Amperes or Less (4 options for determining wattage)

Option 1 - VA rating of branch circuit

Option 2 - Higher of

- connected load, or
- 45 watts linear foot

Option 3 - Higher of

- VA rating certified integral current limiter, or
- 12.5 watts per linear foot.

Note: Integral current limiter must be certified to the Energy Commission. If product is not listed on CEC appliance database, product is not certified.



Rules for Determining Wattage §130(d)

Line-voltage Track and Plug-in Busway Rated for 20 Amperes or Less continued

Option 4 - Sum of ampere rating of all overcurrent protection devices times branch circuit voltage in a dedicated track lighting **supplementary overcurrent protection panel**





Rules for Determining Wattage §130(d)

Specific requirements for dedicated track lighting supplementary overcurrent protection panel

- Listed as defined in § 101
- Use only with line voltage track lighting
- Be permanently installed in an electrical equipment room, or adjacent to lighting panel board providing supplementary overcurrent protection for the track lighting circuits served
- Be prominently labeled “NOTICE: This Panel for Track Lighting Energy Code Compliance Only. The overcurrent protection devices in this panel shall only be replaced with the same or lower amperage. No other overcurrent protective devices shall be added to this panel. Adding to, or replacement of existing overcurrent protective device(s) with higher continuous ampere rating will void the panel listing and require re-submittal and re-certification of California Title 24, Part 6 compliance documentation”





Rules for Determining Wattage §130(d)

Low Voltage

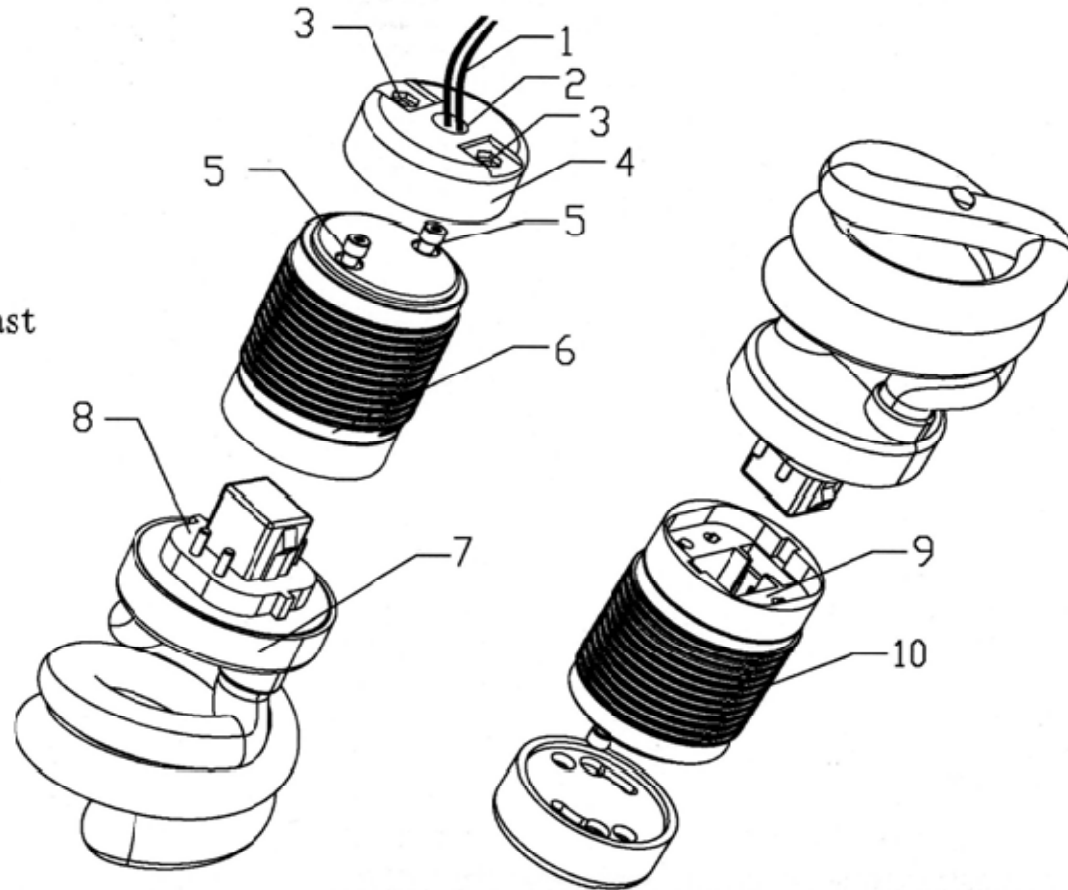
- Luminaires or lighting systems with permanently installed or remotely installed transformers shall be the rated wattage of the lamp / transformer combination supplying the system (applies to track and individual luminaires)
- Where transformer rated > 53 watts, label shall not consist of peel-off or peel-down layers





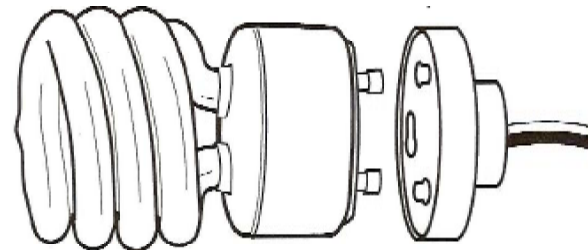
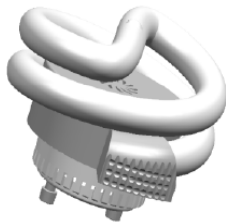
What is a GU-24 ?

1. Lead Wire
2. Fixing Hole I
3. Fixing Holes II
4. Base
5. Prongs
6. Replacement Ballast
7. Replacement Lamp
8. Lamp Base
9. Lamp Holder
10. Thread





What is GU-24 ?





What is GU-24 ?





GU-24 Requirements §130(e)

GU- 24 Products

- The Standards do not promote or discourage the use of GU-24 products

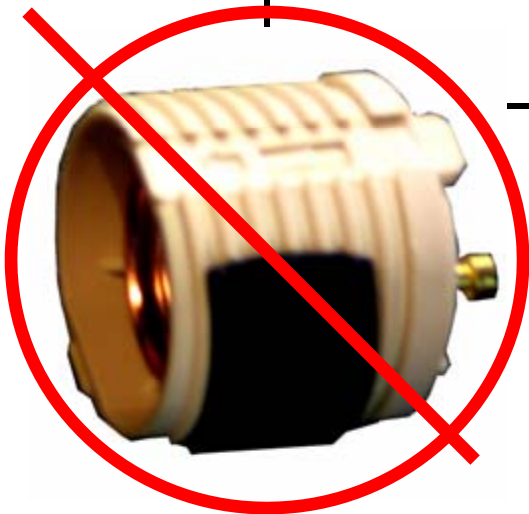


GU-24 Requirements §130(e)

Title 24 Rules for Determining Luminaire Wattage §130(e)

GU-24 Lamps, Luminaires, and Adaptors Installed in California shall not be low efficacy as follows:

- No GU-24 low efficacy lamps
- No GU-24 low efficacy luminaires
- No GU-24 modular adaptors or luminaire conversions





GU-24 Requirements - Title 20

Title 20 (Appliance Efficiency Regulations adopted December 3, 2008)

It is against the laws of the State of California to sell any of the following products in California

- Incandescent lamps with GU-24 bases.
- GU-24 adaptors that adapt a GU-24 socket to any other line-voltage socket.
- Luminaires that are equipped with GU-24 sockets which are rated for incandescent lighting of any kind (including low-voltage or high-voltage.)



GU-24 Requirements

Nowhere in the Standards does Title 24 recognize any type of “permanent” screw-based adaptors

- High efficacy luminaires, for compliance with Title 24, shall not contain screw-base sockets according to §150(k).
- If a luminaire contains a screw-base socket it is not recognized as high efficacy by T24, regardless of manufacturer claims.
- Title 24 does not recognize any “permanent” line-voltage adaptors..





GU-24 Requirements

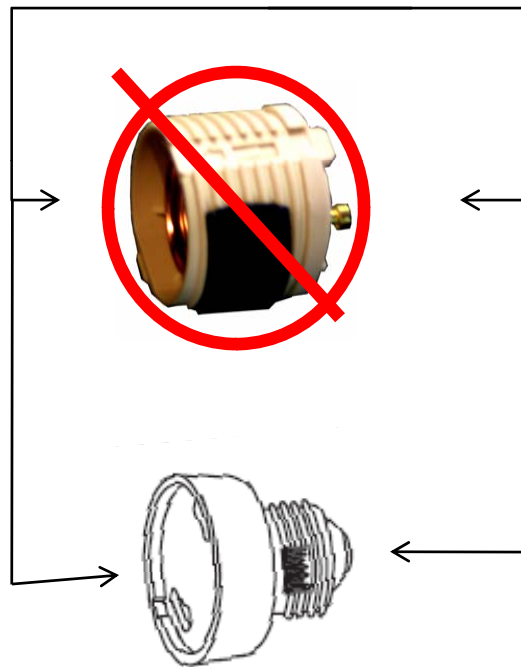
Nowhere in the Standards does Title 24 recognize any type of “permanent” screw-based adaptors

- Adaptors are NOT recognized by Title 24 as converting a low efficacy luminaire to a high efficacy luminaire.
- A luminaire with a screw-based socket will always be classified as an incandescent luminaire, even if a “permanent” adaptor is installed in the luminaire.

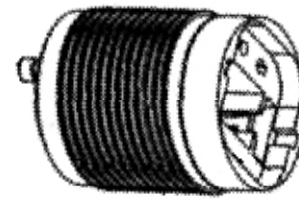




Line-Voltage



Adaptor



Fluorescent Ballast
NOT Adaptor

Low-Voltage



Are there any applications in California that allow screw-based to GU-24 sockets to be used?

- Yes, but only for projects which are not regulated by Title 24 building standards, which include:
 - Existing lighting systems, in existing buildings, which are not part of a Title 24 project.
 - Repairs (replacement of lamps, ballasts, or lenses, which do not involve replacing the fixture), and which are not part of a Title 24 project.





CALIFORNIA ENERGY COMMISSION

Changes to 2008 Title 24 Residential Lighting Standards



High Efficacy Luminaires § 150(k)

- ALL luminaires installed in RESIDENTIAL applications must be classified as high efficacy or low efficacy
- Luminaires installed in nonresidential applications not classified as high efficacy or low efficacy



How to Determine High Efficacy § 150(k) Use total system watts for LED lighting

From Table 150-C	
Wattage Range	Minimum Lumens/Watt
≤ 5 W	30 L/W
> 5 W to 15 W	40 L/W
> 15 W to 40 W	50 L/W
> 40 W	60 L/W





Residential Lighting Standards § 150(k)

How to Calculate System Efficacy

2005

2008

- Efficacy = initial lumens ÷ watts



EXCEPT for LED systems

- LED = system watts (lamp, transformer, power supply & fan...)
- LED must be certified to Commission to be classified as high efficacy





Residential Lighting Standards § 150(k)

Definition of a High Efficacy Luminaire

- Contains only high efficacy lamps
- **Does not contain any medium screw base sockets**
- Is not a low efficacy luminaire as specified in §150(k)





Residential Lighting Standards § 150(k)



Definition of Low Efficacy Lighting

2005

2008

- Any luminaire that does not qualify as high efficacy
- Any luminaire containing a medium screw-base socket (E24/E26)
- Any luminaire containing any type of line-voltage socket

Except GU-24 under certain conditions





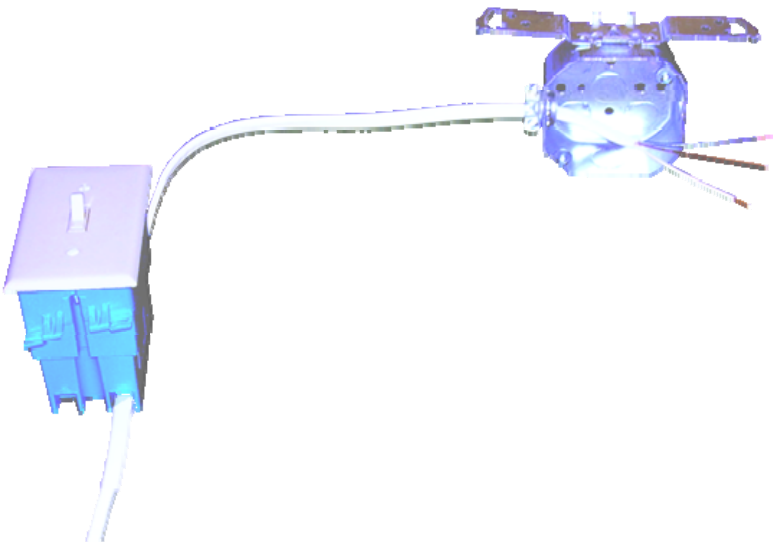
Residential Lighting Standards § 150(k)



Definition of Low Efficacy Lighting continued

2008

- Low voltage incandescent lighting
- Track lighting
- Lighting with modular adaptors which accommodate low efficacy lighting
- Blank electrical boxes





How to Determine High Efficacy § 150(k)

Only Conditions Where LED Qualifies As High Efficacy.

- Meets minimum high efficacy requirements of Table 150(c)
- Includes power supply, transformer, fans
- Based on independent testing lab report in accordance with Reference Joint Appendix 8 (JA8)
- Must be Certified to Energy Commission as high efficacy according to § 119(m)





Residential Lighting Standards § 150(k)

Only Conditions Where GU-24 Can Qualify As High Efficacy.

- Luminaire has only factory installed GU-24 lamp sockets, and
- Luminaire is not a CFL recessed downlight, and
- No other types of line voltage sockets are in the luminaire, and
- The manufacturer does not provide adaptors to convert GU-24 socket to any other line voltage lamp holder, and
- Luminaire is rated only for high efficacy lighting systems according to Table 150-C.



Residential Compliance Manual Chapter 6.2.10

- An LED source system with a standardized base is an LED lamp
- Does not qualify as a high efficacy luminaire





How to Certify LED lighting to the Energy Commission

Certification completed by manufacturers:

- Includes declaration of compliance, executed under penalty of perjury of the laws of California
- Database of certified devices, and certification instructions are available from the following web link:

<http://www.energy.ca.gov/appliances/appliance/index.html>



Title 24 IS NOT Energy Star

- California Title 24 requirements ARE NOT subject to Energy Star requirements
- Energy Star specifications cannot be used in lieu of California Title 24 specifications



Requires independent testing lab reports

Additional language in 2008 Residential Compliance Manual supplements the Title 24 testing language

- IES LM-79-08 is allowed as an alternate test method, provided that:
 - Wattage is determined in accordance with JA-8.2
 - Testing lab is accredited in accordance with JA-8.2(c)
 - Efficacy is calculated in accordance with JA-8.4



Continuing Efforts Related to LED Lighting

Background:

- There will continue to be both high efficacy and low efficacy LED lighting, as defined by Title 24, for the foreseeable future
- Two most common formats for LED lighting systems available today are:
 - Dedicated LED luminaires
 - LED “trims”

An LED trim is a one-piece integral unit containing the power supply, transformer, heat sink, and LED circuit board, and is designed to be installed into a recessed luminaire housing.





Continuing Efforts related to LED Lighting

Background continued:

- Many manufacturers of LED trims currently install their LED trims into someone else's luminaire. They do not manufacture their own luminaire housing
- These third-party luminaire housings are typically classified as low efficacy according to Title 24
- So as to not impede high efficacy LED lighting systems from the market, the Energy Commission has options in the 2008 Residential Compliance Manual to address conditions high efficacy LED trims, when installed into low efficacy luminaires, may be classified as high efficacy
- These issues are unique to LED trims. Therefore, the solution must apply only to LED trims, and not to any other lighting technology. For example, it shall not apply to CFL trims.



Continuing Efforts related to LED Lighting

Background continued:

- Field modified luminaires may lose their UL listing
- These UL issues will have to be settled with UL. This is not a Title 24 Building Energy Efficiency Standards issue.



Continuing Efforts related to LED Lighting

- Following is language in the 2008 Residential Compliance Manual:
 - The UL listing of the luminaire housing must be addressed with UL
 - The LED trim must be certified to the Energy Commission as high efficacy according to Table 150-C, or it shall be considered low efficacy.
 - The LED trim must be hardwired directly into the luminaire housing. The wiring assembly may include some kind of mid-line connection, like a GU-24, or other such connector between the LED trim and the wire ends used to hardwire the assembly to the housing.

However, under no circumstances shall the connection include a screw-base.

Continued on next page



Continuing Efforts related to LED Lighting

- Following is language in the 2008 Residential Compliance Manual:
 - The luminaire housing cannot contain any type of screw-base socket.
 - Screw-base adaptors shall not be used, even if the manufacturer considers them to be “permanent”
 - An LED trim, provided by the manufacturer with a screw-base “pig-tail,” shall NOT be installed unless the base is cut off and discarded prior to installation, and the trim must be permanently hardwired into the luminaire



Multiple-LED Luminaires connected to a Single Power Supply

Additional information in the 2008 Nonresidential Compliance Manual:

- When multiple luminaires are connected to a single power supply/driver, the label used to determine the maximum wattage of the LED system
 - Shall be located on the LED power supply/driver
 - And wattage of the system shall be based on the connected load of that LED power supply/driver as determined by the luminaire manufacturer
 - Or the rating of that LED power supply/driver as determined by the manufacturer of the power supply/driver.



Residential Lighting Standards § 150(k)

Only Condition Where Medium Screw Base Socket Can Qualify As High Efficacy.

2005	2008
<ul style="list-style-type: none">• Only for manufactured high intensity discharge (HID) luminaire, and• Must meet minimum lumens per watt of Table 150-C, and• Factory-installed HID ballast, and• HID rated socket	<ul style="list-style-type: none">• Only for manufactured high intensity discharge (HID) luminaire, and• Must meet minimum lumens per watt of Table 150-C, and• Factory-installed HID ballast, and• HID rated socket
<ul style="list-style-type: none">• Only outdoor	<ul style="list-style-type: none">• Outdoor or indoor





Residential Lighting Standards § 150(k)

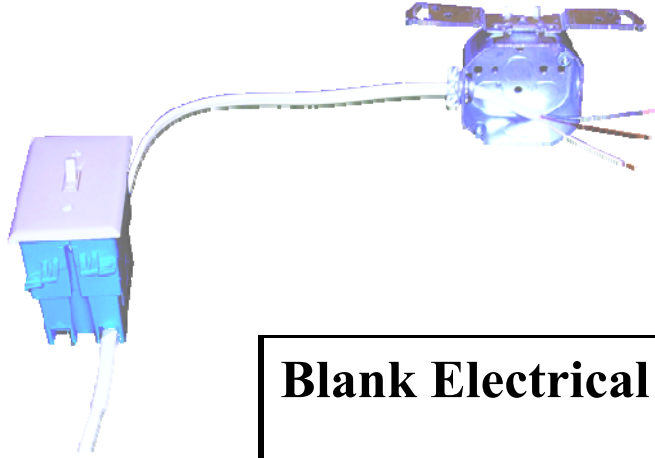
Electronic ballasts required for lamps rated 13 watts or greater

2005	2008
<ul style="list-style-type: none">To qualify as a high efficacy luminaire	<ul style="list-style-type: none">For all luminaires





Residential Lighting Standards § 150(k)



Blank Electrical Boxes in Kitchen

2008

- Shall be calculated and treated as 180 watts of low efficacy lighting



Residential Lighting Standards § 150(k)

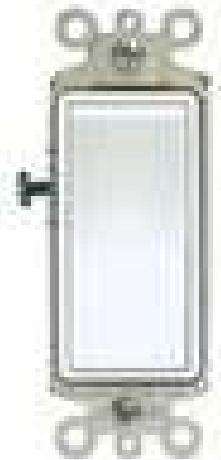
Switching Requirements

2005

2008

- High efficacy / low efficacy lighting systems must be separately switched
- Controls must be installed according to manufacturer instructions

- Exhaust fans switched separately from lighting. Exception: light switched manually on/off in conjunction with an auto time-out switch on fan.
- All controls permit manual on and off
- No override of dimmer or vacancy sensor installed to comply with § 150(k)
- Controls are certified per § 119





Residential Lighting Standards § 150(k)

Permanently Installed Night Lights and Night Lights Integral to Permanently Installed Luminaire or Exhaust Fan

2005

2008

1. Shall contain only high efficacy lamps with no line voltage lamp holder
or
2. Shall consume no more than 5 watts with no screw-base lamp holder.

Indicator lights that are integral to lighting controls shall consume no more than 1 watt





Residential Lighting Standards § 150(k)

Recessed luminaires in insulated ceilings

Zero-Clearance IC

2005

2008

- Must be approved for zero-clearance insulation cover (IC)





Residential Lighting Standards § 150(k)

Recessed luminaires in insulated ceilings

Airtight

2005

2008

- Must be certified airtight (ASTM E283)
- Sufficiently airtight to prevent the flow of heated or cooled air between conditioned and unconditioned spaces
- Gasket or caulk between luminaire and ceiling
- All air leak paths through luminaire assembly or ceiling opening must be sealed



Residential Lighting Standards § 150(k)

Recessed luminaires in insulated ceilings	
BALLASTS	
2005	2008
	<ul style="list-style-type: none">• To qualify as high efficacy ballasts shall be certified to comply with Section 119(n)• Must allow ballast maintenance and replacement readily accessible from below the ceiling without cutting holes in ceiling.



Residential Lighting Standards § 150(k)

Bathroom Exhaust Fans

2005

2008

- Lighting subject to lighting Standards
- Fan housing not required to be certified airtight
- Gasket or caulk required between exhaust fan housing and ceiling.





Residential Lighting Standards § 150(k)

Definition of a Kitchen	
2005	2008
<ul style="list-style-type: none">• Kitchen in a residential dwelling unit is a room or area used for cooking, food storage and preparation and washing dishes, including associated counter tops and cabinets, refrigerator, stove, ovens, and floor area.	
<ul style="list-style-type: none">• Adjacent areas are considered Kitchen if the lighting for the adjacent areas is on the same switch as the lighting for the Kitchen.	



Residential Lighting Standards § 150(k)

Lighting Internal to Cabinets

2005	2008
<ul style="list-style-type: none">• IS considered part of the kitchen lighting for calculating 50%	<ul style="list-style-type: none">• NOT considered part of the kitchen lighting for calculating 50%• Shall use no more than 20 W/ linear foot of illuminated cabinet





Internally Illuminated Cabinets



You may use either the width of the cabinet section or the height of the glazing per cabinet section, regardless of the number of shelves or doors on the cabinet.





Residential Lighting Standards § 150(k)

Kitchen Lighting Wattage	
2005	2008
<ul style="list-style-type: none">• $\geq 50\%$ of installed wattage must be high efficacy	
	<ul style="list-style-type: none">• Additional low efficacy wattage may be available under certain conditions (<i>see next 2 slides</i>)



Residential Lighting Standards § 150(k)

**Additional Low Efficacy Kitchen Lighting Wattage
Exempt from 50% High Efficacy Requirement
Only When All Conditions Have Been Met
(See next slide)**

2005	2008
	<ul style="list-style-type: none">• Up to 50 watts per dwelling units $\leq 2,500 \text{ ft}^2$
	<ul style="list-style-type: none">• Up to 100 watts per dwelling units $> 2,500 \text{ ft}^2$



Residential Lighting Standards § 150(k)

All Conditions Required to qualify for Additional Kitchen Low Efficacy Lighting Wattage

2005

2008

1. All low efficacy luminaires in Kitchen controlled by vacancy sensor, dimmer, EMCS, or multi-scene programmable control, and
2. All luminaires in garages, laundry, closets $> 70 \text{ ft}^2$, utility rooms must be high efficacy AND also must be controlled by a vacancy sensor





Residential Lighting Standards § 150(k)

Bathrooms, Garages, Closets Laundry Rooms, and Utility Rooms

2005

- bathrooms, garages, closets, laundry rooms, and utility rooms

2008

- bathrooms, **attached and detached** garages, closets, laundry rooms, and utility rooms

All installed lighting must be

- high efficacy, or
- controlled by a vacancy sensor certified to CEC

Low efficacy luminaires allowed in closets less than 70 ft²



Residential Lighting Standards § 150(k)

For all other rooms

(Any room that is not a Kitchen, Bathroom, Garage, Laundry Room, or Utility Room)

2005

2008

All hardwired lighting must be

- high efficacy, or
- controlled by a vacancy sensor, or
- controlled by a dimmer

- Lighting in detached storage buildings less than 1000 square feet located on a residential site not required to comply.





Residential Lighting Standards § 150(k)

Outdoor lighting attached to a building	
2005	2008
	<ul style="list-style-type: none">All outdoor lighting attached to buildings must be high efficacy, or
controlled by both a motion sensor and an integral photocontrol	<ul style="list-style-type: none">controlled by a motion sensor in addition to one of the following methods:
	<ul style="list-style-type: none">Photocontrol not having an override or bypass switch, orAstronomical time clock not having an override or bypass switch, orEnergy management control system (EMCS) not having an override or bypass switch that allows the luminaire to be always on.



Residential Lighting Standards § 150(k)

Outdoor lighting attached to a building

2005

2008

- Exception to high efficacy: Outdoor luminaires in or around swimming pools, water features, or other locations subject to Article 680 of the California Electric Code

Summary of Article 680 is in the Residential Compliance Manual

Low efficacy outdoor luminaires may have temporary override switch which bypasses the motion sensing function for up to six hours provided that the override switch automatically reactivates the motion sensor.



Residential Lighting Standards § 150(k)

Outdoor Lighting for High-rise Residential Dwelling Units and Hotel/Motel Guest Rooms

if separately controlled from the inside of a high-rise residential dwelling unit or guest room



2005	2008
	<ul style="list-style-type: none"><li data-bbox="989 948 1814 1073">• T24 Standards: ...shall comply with Section 150(k)12.



Residential Lighting Standards § 150(k)

Residential parking lots and garages for 8 or more vehicles

2005

2008

Must meet the lighting requirements for nonresidential buildings, which may include:

- Automatic shutoff controls
- Bi-level switching
- > 175W cutoff
- Minimum efficacy or motion sensor
- Lighting power allowances per Lighting Zone (LZ)



Residential Lighting Standards § 150(k)

Common Areas of low-rise residential buildings with 4 or more dwelling units

2005

2008

- All hardwired lighting must be high efficacy or controlled by an occupant sensor.



Residential Lighting Standards § 150(k)

Internally illuminated address signs	
2005	2008
Interpretation: Shall comply with Sign Standards (§148)	Shall comply with Sign Standards (§148)
<ul style="list-style-type: none">• 12 watts per square foot internal illumination• 2.3 watts per square foot external illumination OR <ul style="list-style-type: none">• Alternative option: Equipped only with one or more of the light sources shown on the next slide	



Residential Lighting Compliance Forms

2005	2008
<p>MF-1R</p> <ul style="list-style-type: none">• Mandatory Measure Summary• Includes <u>checklist</u> for residential lighting measures	<p>MF-1R</p> <ul style="list-style-type: none">• Mandatory Measures Summary• Includes <u>summary</u> of residential lighting measures
<p>WS-5R</p> <ul style="list-style-type: none">• Residential Kitchen Lighting Worksheet• Documents failed to say form must be submitted	<p>CF-6R-LTG-01</p> <ul style="list-style-type: none">• Installation Certificate for residential lighting• Residential Compliance Manual says this form must be submitted for <u>any and all</u> lighting measures