

# Access Fixtures

## **California Residential Energy Efficiency Standards (2005)**

**2005 Standards were initially effective through July 31, 2009. The 2005 Standards will stay in effect until December 31, 2009. The following document references the 2005 standards.** (Please note- The 2008 rulemaking process has been completed. 2008 Standards will become effective January 1, 2010 \*)

The Energy Commission adopted the 2005 changes to the Building Energy Efficiency Standards, for a number of compelling reasons:

1. To respond to California's energy crisis to reduce energy bills, increase energy delivery system reliability, and contribute to an improved economic condition for the state;
2. To respond to the AB 970 (Statutes of 2000) urgency legislation to adopt and implement updated and cost-effective building energy efficiency standards;
3. To respond to the SB 5X (Statutes of 2001) urgency legislation to adopt energy efficiency building standards for outdoor lighting; and
4. To emphasize energy efficiency measures that save energy at peak periods and seasons, improve the quality of installation of energy efficiency measures, incorporate recent publicly funded building science research, and collaborate with California utilities to incorporate results of appropriate market incentives programs for specific technologies.

*\* The Energy Commission adopted the 2008 Standards on April 23, 2008, and the Building Standards Commission approved them for publication on September 11, 2008. The effective date for the 2008 Building Energy Efficiency Standards has been changed from August 1, 2009 to January 1, 2010. The requirement for when the 2008 Standards must be followed is dependent on when the application for the building permit is submitted. If the application is submitted on or after January 1, 2010, the 2008 Standards must be met. [More information](#)*

## **Definition of High Energy Efficiency Lighting**

- 15 Watts or Less- Minimum of 40 lumens per watt\*
- 15-40 Watts- Minimum of 50 lumens per watt\*
- Over 40 Watts- Minimum of 60 lumens per watt\*

*\* The lumen is the SI unit of luminous flux, a measure of the perceived power of light. (Wikipedia). A watt is the amount of power used to light the bulb. (Northwest Energy)*

Must not contain medium based incandescent\* sockets [except for outdoor high intensity discharge lighting (HID) containing an HID lamp, and factory-installed hardwired HID ballast and HID rated socket, and meeting minimum lumens per Watt].

*\* The incandescent light bulb, incandescent lamp or incandescent light globe is a source of electric light that works by incandescence. Incandescence is the emission of light (visible electromagnetic radiation) from a hot body due to its temperature. The technology is now on the way out. In today's energy-hungry world, the devices are too wasteful: some 98% of the energy input ends up as heat instead of light. Incandescent light bulbs are gradually being replaced in many applications by other types of electric light such as (compact) fluorescent lamps, high-intensity discharge lamps, light-emitting diodes (LEDs), and other devices. These newer technologies give more visible light for the same amount of electrical energy input, and often generate*

*much less heat. Some jurisdictions, such as the European Union are in the process of phasing-out the use of incandescent light bulbs in favor of more energy-efficient lighting. (Wikipedia)*

## Ballast Requirements

Ballasts\* for lamps rated 13 Watts or greater shall be electronic and shall have an output frequency of no less than 20 kHz.

*\* An electrical ballast (sometimes called control gear) is a device intended to limit the amount of current in an electric circuit. (Wikipedia)*

## How to determine system efficacy

- For all pin-based fluorescent systems, only the Watts of the lamp (not the ballast) need to be considered. Divide the initial lamp lumens by the lamp Watts. Virtually all pin-based fluorescent systems will qualify as HIGH-efficacy for the residential lighting standards. Example:

	Initial Lumens	Watts	Efficacy
13-Watt Quad	900 Lumens	13 Watts	69.2 lpW

- All screw based lighting systems without factory installed hardwired ballasts are considered **LOW**-efficacy.
- All low-voltage incandescent lighting is considered **LOW**-efficacy lighting (including tungsten halogen, MR-11 and MR-16).
- All line voltage and low voltage tracks are considered **LOW**-efficacy for residential lighting standards, regardless of the lamp type attached to the track.
- It must always be assumed that incandescent lamps will be used.
- There are **no** high intensity discharge (HID) lighting systems (mercury vapor, high pressure sodium, metal halide) with medium based sockets that qualify as high efficacy for **interior** residential lighting.
- To determine efficacy for HID outdoor lighting fixtures, divide the initial rated lamp lumens by the system Watts (include lamps plus ballast Watts).
- Nearly all mercury vapor systems will be LOW-efficacy, and most other HID systems will qualify as HIGH-efficacy.

## How to determine wattage

Luminaires with modular components that allow conversion between screw-based and pin-based sockets without changing the luminaire housing or wiring are considered low efficacy.

It must be assumed that the maximum relamping or system wattage rated for that platform will be used.

## Switching Requirements

High efficacy lighting system must be operated on separate switch from any incandescent or other low efficacy lighting system.

*...continue for kitchen standards*

## Kitchen Lighting

*Definition:* 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. Adjacent areas are considered Kitchen if the lighting for the adjacent areas is on the same switch as the lighting for the Kitchen.

- At least 50% of installed wattage must be high efficacy. Lighting in areas adjacent to the Kitchen (i.e.Nook) is considered Kitchen lighting if it is on the same switch as the Kitchen lighting.
- High efficacy lighting must be switched separately from low efficacy lighting. There are no longer any constraints on where the separate switches are located.
- For Kitchens, at least 50% of the installed wattage must be high efficacy. **NO EXCEPTION.**
- Kitchen is the **only** room where wattage is a factor in residential lighting standards compliance. It must be established that at least 50% of the installed wattage is high efficacy.
- This means that for every four or five high efficacy fixtures, one low efficacy Kitchen lighting fixture may be installed.

### How to determine WATTAGE

- When calculating the energy use of low-efficacy (screw-based) lighting for residential Kitchens, it does not matter what lamp wattage or lamp type is used in a screw-based fixture.
- It must always be assumed that an incandescent lamp of the maximum relamping rated wattage will be used.
- The label on the fixture showing the maximum relamping rated wattage must be permanently installed on the fixture at the factory. Field installed labels are not allowed.
- For all luminaires with incandescent lamp holders the maximum rated relamping wattage shall be used, not the wattage of the lamps that are installed.

**Examples:**

Low Efficacy System	Required High Efficacy System
1 recessed can with screw based socket  Relamping rated wattage on factory installed label = 100 Watts.  Low Efficacy System = 100 Watts	Minimum Required: 100 Watts  Example: 4 CF fixtures x 26 Watts = 104 Watts (Assuming input wattage on electronic ballast = 26 Watts.)

Low Efficacy System	Required High Efficacy System
2 recessed cans with screw based sockets.  Relamping rated wattage on factory installed label = 100 Watts.  Low Efficacy System = 200 Watts	Minimum Required: 200 Watts  Example: 5 CF fixtures x 26 Watts = 130 Watts Plus minimum 70 Watts high efficacy/electronic ballasts under cabinet lighting

### **Standards say:**

The wattage of line-voltage lighting track and plug-in busway which allows the addition or relocation of luminaires without altering the wiring of the system shall be the volt-ampere rating of the branch circuit feeding the luminaires or an integral current limiter controlling the luminaires, or the higher of the maximum relamping rated wattage of all of the luminaires included in the system, listed on a permanent factory-installed label, as specified by UL 1574, or 45 Watts per linear foot.

#### **Kitchen Track Lighting**

- Add the maximum relamping rated wattage of all installed track heads to determine if more than 45 Watts per linear foot has been used.
- If using more than 45 Watts per foot of track, then you must use the larger number, otherwise use 45 Watts per foot of track.
- A dimmer switch does **NOT** qualify as an integral current limiter controlling the luminaires.
- **STANDARDS SAY:**
  1. The wattage of low-voltage lighting track, cable conductor, rail conductor, and other low voltage flexible lighting systems, which allows the addition or relocation of luminaires without altering the wiring of the system, shall be the rated wattage of the transformer supplying the system, listed on a permanent factory installed label, as specified by UL 1574 or UL 1598.
  2. The wattage of all other miscellaneous lighting equipment [only lighting equipment not already addressed in §130 (c) 1 through 4] shall be the maximum rated wattage [for incandescent] of the lighting equipment, or operating input wattage [for any other lighting system not addressed in §130(c) 1 through 4, including low-voltage mono point systems] of the system, listed on a permanent factory-installed label, or published in manufacturer's catalogs, based on independent testing lab reports as specified by UL 1574 or UL 1598.

*...continue for other rooms*

## **Bathroom, Garages, Laundry Rooms, and Utility Rooms Lighting**

*Definition:* Bathroom is a room containing a shower, tub, toilet or a sink that is used for personal hygiene.

- All hardwired lighting must be high efficacy, or controlled by a manual-on occupant sensor (must turn off automatically when no one is present, then as normally done when lighting is needed, must be turned on manually with a switch) High efficacy lighting must be switched separately from low efficacy lighting. There are no longer any constraints on where the separate switches are located.
- Lighting in Garages, Laundry Rooms, and Utility Rooms must all meet the same requirements as apply to Bathrooms.

### **For all other rooms (i.e. hallways, stairs, dining rooms, etc.)**

- All hardwired lighting must be high efficacy, or controlled by a manual-on occupant sensor, or controlled by a dimmer. Lighting in Garages, Laundry Rooms, and Utility Rooms must all meet the same requirements as apply to Bathrooms.
- Exception: Closets less than 70 square feet are exempt from this requirement.

*...continue for outdoor lighting*

## **Outdoor Lighting**

### **Outdoor lighting attached to a building**

All outdoor lighting attached to buildings must be high efficacy, or controlled by both a motion sensor AND photocontrol.

Lighting NOT attached to a building, like landscape lighting, is exempt from this requirement.

### **Residential parking lots and garages for 8 or more vehicles**

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

- Mandatory Measures:
  1. Automatic shutoff controls
  2. Bi-level switching
  3. +175W cutoff
  4. Minimum efficacy or motion sensor
- Lighting power allowances per Lighting Zone (LZ)

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

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

*...continue for summary chart*

### Summary Table of 2005 Residential Lighting Standards

<b>Kitchen</b>	Electronic Ballasts for all lamps rated 13 Watts or greater	All Hardwired Lighting Must be High Efficacy	Alternate option: Up to 50% of relamping rated WATTAGE can be other than high efficacy
<b>Bathroom Garage Laundry Room Utility Room</b>	Recessed luminaires in all insulated ceilings approved for zero-clearance insulation cover (IC) and certified airtight		Alternate option: Manual-on occupant sensor
<b>All other interior rooms (i.e.: Hallway, Dining Room, Bedroom)</b>			Alternate options: Manual-on occupant sensor, or dimmer
<b>Outdoor lighting attached to buildings</b>			Alternate option: Motion sensor plus photo control
<b>Common Areas of low-rise residential buildings with 4 or more dwelling units</b>	Switch all high efficacy lighting separate from low efficacy lighting		Alternate option: Occupant sensor
<b>Residential parking lots and garages for 8 or more vehicles</b>	Must meet 2005 Nonresidential Building Standards		

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