



# HIGH EFFICACY LIGHTING FOR RESIDENTIAL APPLICATIONS

Under the 2016 Building Energy Efficiency Standards

New regulations in the 2016 Building Energy Efficiency Standards require that lighting in new homes be high efficacy, while also expanding the types of lighting that qualify as high efficacy. This change eliminates most space by space requirements and ensures that a variety of lighting technologies and techniques are available to builders and contractors.

## WHAT'S NEW IN THE 2016 ENERGY STANDARDS



### JA8 QUALIFICATION REQUIREMENTS

Lighting that does not automatically qualify as high efficacy must be certified to the Energy Commission as compliant with **Reference Joint Appendix JA8**. To qualify as high efficacy lighting, products must meet certain conditions with regard to luminous efficacy, power factor, start time, color characteristics, and survival rate. In addition, products must adhere to certain dimming regulations and submit to reduced audible noise and flicker regulations. All enclosed luminaires and luminaires recessed into ceilings must also follow JA8 certification and performance requirements.



### EXPANDS HIGH EFFICACY PRODUCT LIST

Previously, **Reference Joint Appendix JA8** defined efficacy and color requirements for LED luminaires only. JA8 now contains qualification requirements for additional types of residential high efficacy lamps and luminaires. This expands the products that can be used to meet high efficacy requirements.



### ELIMINATION OF SPACE-BY-SPACE REQUIREMENTS

All light sources are now required to be high efficacy, which eliminates the need for individual requirements based on space type. Table 150.0-A lists the light sources that qualify as high efficacy. The Appliance Efficiency Database provides a list of JA8 certified high efficacy light sources that meet JA8 high efficacy light source requirements.

Please watch the Energy Commission video series on Lighting Alterations offered at the Energy Commission's Online Resource Center: [http://www.energy.ca.gov/title24/orc/lighting/2016\\_lighting.html](http://www.energy.ca.gov/title24/orc/lighting/2016_lighting.html) The 2016 Building Energy Efficiency Standards may be found at <http://www.energy.ca.gov/title24/2016standards/>.

# GENERAL REQUIREMENTS

Indoor and outdoor luminaires for new homes must be high efficacy. This is specified in **§150.0(k)1A** of the Energy Standards. Any luminaire, except screw based recessed downlight luminaires, can be classified as high efficacy if the installed light source meets the requirements in **Table 150.0-A** of the Energy Standards. Light sources that do not automatically qualify as high efficacy must be certified per **Reference Joint Appendix JA8** to be classified as high efficacy.

## Mandatory Measures

Under the 2016 Energy Standards, all luminaires that utilize a screw-based socket, excluding hard-wired ballasted HID's, must contain lamps that comply with JA8 high efficacy requirements.

Recessed downlight luminaires and enclosed luminaires must contain a light source that complies with JA8, including elevated temperature requirements.

Light sources which automatically qualify as high efficacy must still meet JA8 requirements if installed in a ceiling recessed downlight or enclosed luminaire.

## Appliance Efficiency Database

The California Energy Commission maintains the Appliance Efficiency Database that lists a variety of products that are certified as meeting the current Title 20 and Title 24 requirements. Lighting products installed to comply with the Energy Standards must meet minimum requirements contained in the Title 20 Appliance Efficiency Regulations, the Energy Standards, and/or JA8.

JA8 compliant high efficacy light sources must be listed in the Appliance Efficiency Database. Manufacturers must test their products at an accredited test laboratory and submit the results to the Energy Commission to self-certify that their product meets the requirements of JA8. A list of JA8 compliant products may be found at <https://cacertappliances.energy.ca.gov>.

**Table 150.0-A Classification of High Efficacy Light Sources**

High Efficacy Light Sources	
Only luminaires installed with the light sources listed 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"> <li>Pin-based linear or compact fluorescent light sources using electronic ballasts.</li> <li>Pulse-start metal halide.</li> <li>High pressure sodium.</li> <li>GU-24 sockets containing light sources other than LEDs. <sup>a,b</sup></li> <li>Luminaires with hardwired high frequency generator and induction lamp.</li> <li>Inseparable SSL luminaires that are installed outdoors.</li> <li>Inseparable SSL luminaires containing colored light sources that are installed to provide decorative lighting.</li> </ol>	<ol style="list-style-type: none"> <li>All light sources in ceiling recessed downlight luminaires. Note that ceiling recessed downlights shall not have screw bases regardless of lamp type as described in Section 150.0(k)1C.</li> <li>GU-24 sockets containing LED light sources.</li> <li>Any light source not otherwise listed in this table and certified to the Commission as complying with Joint Appendix JA8.</li> </ol>
Notes:	
<ol style="list-style-type: none"> <li>GU-24 sockets containing light sources such as compact fluorescent lamps and induction lamps.</li> <li>California Title 20 Section 1605.3(k)4 does not allow incandescent sources to have a GU-24 base.</li> </ol>	

## REFERENCE JOINT APPENDIX JA8

Light sources which must meet JA8 requirements to be classified as high efficacy are listed on the right side of **Table 150.0-A**. To qualify as high efficacy lighting under JA8, products must meet certain conditions with regard to luminous efficacy, power factor, start time, color characteristics, and survival rate.

All JA8 sources must also be dimmable. This addresses the concern of lamp failure, flicker, and otherwise poor performance when non-dimmable lamps are installed on dimmers, and also responds to significant consumer dissatisfaction resulting from non-dimmable CLFs.

Manufacturers must test their products at an accredited test laboratory to verify that their products meet all specifications of JA8. The test results and submittal information is then sent to the Energy Commission to self-certify that the product meets all JA8 requirements. The product is then listed in the Energy Commission's Appliance Efficiency Database.

The tests that need to be performed by an accredited test laboratory include:

- Efficacy
- Power Factor
- Start Time
- Color Characteristics
- Ambient Temperature Life
- Elevated Temperature Life
- Minimum Dimming Level, Flicker, and Audible Noise

Products that are required to meet JA8 requirements must also adhere to certain marking requirements. These markings include JA8-2016 and JA8-2016-E. A JA8-2016 marking indicates that the product is in compliance with the JA8 criteria. The JA8-2016-E marking represents light sources that have passed the elevated temperature life test; indicates that they comply with JA8 criteria and may additionally be installed in elevated temperature applications such as enclosed fixtures and recessed downlights.

## COMPLIANCE PROCESS AND DOCUMENTS

There are two groups responsible for ensuring that the residential compliance process is followed: Plans Examiners and Building Inspectors. The documentation that is needed for the residential compliance process includes:

- Certificate of Installation CF2R-LTG. This is the primary compliance documentation for residential lighting.
- Schedule of interior luminaires and lamps installed to comply with §150.0(k).
- Documentation on installed control systems.

### Plans Examiners

The CF1R does not include any lighting measures to verify. To ease verification of compliance, plans examiners can require that the mandatory measures summary be provided at plan submittal. This summary can be found at [http://www.energy.ca.gov/title24/2016standards/documents/2016\\_Residential\\_Mandatory\\_Measures\\_Summary.pdf](http://www.energy.ca.gov/title24/2016standards/documents/2016_Residential_Mandatory_Measures_Summary.pdf). If the plans examiner feels there is not enough information, they can request that additional information be provided.

### Building Inspectors

Building inspectors are responsible for examining buildings and ensuring that construction, alterations, or repairs comply with building codes, local ordinances, zoning regulations, and contract specifications.

Specific roles of the Building Inspector include:

- Confirming that high efficacy products are installed and that products match those specified on the electrical plans.
- Confirming that all required controls are installed and functioning.
- Verifying that recessed ceiling downlights do not contain a screw base.
- Verifying that recessed ceiling downlights and enclosed luminaires contain sources with a JA8-2016-E marking to indicate that the light source is JA8 certified and also meets elevated temperature requirements.
- Verifying that a schedule of all interior luminaires and lamps installed to comply with §150.0(k) is provided for the building owner.



LAMP EXAMPLE COURTESY OF SORAA

