



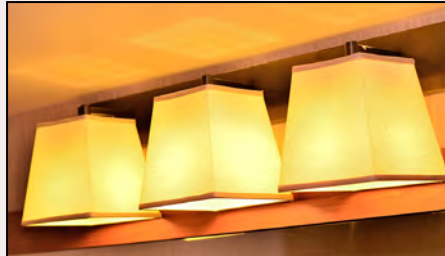
New Testing and Certification Requirements

On January 1, 2017, new lighting requirements in California's Building Energy Efficiency Standards (Title 24, Part 6 or Energy Standards) for new construction will be in effect. The Energy Standards require high efficacy lighting throughout newly constructed homes, and the definition of "high efficacy" luminaire has been expanded to include luminaires containing light sources that meet the new performance requirements outlined in Title 24 Reference Joint Appendix JA8 (JA8), Qualification Requirements for High Efficacy Light Sources. In addition to more quality and efficacy requirements, JA8 now also references Joint Appendix JA10 (JA10), Test Method for Measuring Flicker of Lighting Systems and Reporting Requirements, for additional flicker testing and data reporting requirements for JA8 light sources.

To qualify as a JA8 light source for compliance with Section 150.0(k) of the 2016 Energy Standards, the light source must be certified to the California Energy Commission in accordance with JA8 and JA10. This fact sheet is designed to help manufacturers understand how to certify their lighting equipment.

Why?

These residential lighting requirements are designed to significantly reduce energy use in new homes. The California Energy Commission estimates 110,000 single-family homes and 30,000 multifamily dwelling units will be built in California in 2017. The new requirements are projected to reduce lighting energy use in these homes by roughly 50%. Projected energy savings for the first year of implementation (2017) equal the amount of electricity consumed annually by 13,000 typical California homes (85 GWh).



Relevant Code Sections

2016 California Building Energy Efficiency Standards, Title 24, Part 6:

- Section 100.1 – Definitions and Rules of Construction
- Section 110.9(e) – JA8 High Efficacy Light Sources
- Section 110.9(f) – Ballasts for Residential Recessed Luminaires
- Section 130.0 – Lighting Systems and Equipment and Electrical Power Distribution Systems
- Section 150.0(k) – Residential Lighting
- Joint Appendix JA1 – Glossary
- Joint Appendix JA8 – Qualification Requirements for High Efficacy Light Sources
- Joint Appendix JA10 – Test Method for Measuring Flicker of Lighting Systems and Reporting Requirements

Requirement Highlights



- All luminaires installed in new single-family homes, townhouses, and dwelling units of new multifamily buildings must be high efficacy luminaires. The residential lighting requirements in Section 150.0(k) also apply to dwelling units of nonresidential buildings including those in high-rise residential, fire station, and dormitory and senior-housing buildings, as well as hotel and motel guest rooms.
- The definition of “high efficacy” has expanded to allow luminaires that contain screw-base sockets or sockets designed for other traditionally incandescent or halogen base types as long as these luminaires have JA8-certified lamps installed in them at the time of inspection.
 - There is no requirement for JA8 light sources to be shipped with fixtures (i.e., “bulb-in-a-box” approach.) JA8 sources / lamps can be purchased separately and installed by the builder throughout the home, as long as they are installed in the luminaires before inspection by the building department.
- Under JA8, high efficacy light sources include ballasts or drivers if needed for operation of the light source, and light sources must be certified together with a driver or ballast. If the light source is inseparable from the luminaire the entire luminaire must meet the requirements in JA8.
- JA8 requirements cover performance criteria including, but not limited to, efficacy, dimmability, longevity, color temperature, color rendering, flicker (light modulation), start time, audible noise and power factor.
- JA8 light sources must contain a marking on the product itself, identifying it as a JA8 source. The marking must read either “JA8-2016” or, for products intended to be used in enclosed or recessed luminaires, “JA8-2016-E”.
 - Products installed in recessed or enclosed luminaires must contain the “JA8-2016-E” (rated at elevated temperatures) marking.
- Recessed downlights must contain JA8-certified sources, but they are not allowed to use screw-bases. Screw-based lamps (even if they meet JA8) may not be installed in downlights.
- The 2016 Energy Standards require GU-24 based LEDs to comply with JA8, in order to be classified as high efficacy. However, all other “legacy” high efficacy sources (those already deemed as high efficacy in the 2013 standards, such as GU-24 based CFLs and other pin-based fluorescent lamps) are still considered high efficacy by the 2016 Energy Standards.

Qualifying as High Efficacy

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"> 1. Pin-based linear or compact fluorescent light sources using electronic ballasts. 2. Pulse-start metal halide. 3. High pressure sodium. 4. GU-24 sockets containing light sources other than LEDs. ^{a,b} 5. Luminaires with hardwired high frequency generator and induction lamp. 6. Inseparable SSL luminaires that are installed outdoors. 7. Inseparable SSL luminaires containing colored light sources that are installed to provide decorative lighting. 	<ol style="list-style-type: none"> 8. 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. 9. GU-24 sockets containing LED light sources. 10. 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.	

How to Comply

Compliance with [JA8](#) and [JA10](#) entails designing and marking products according to the regulations, testing regulated products using the required test methods, and certifying the product to the Energy Commission's [Appliance Efficiency Database](#). Certifiers may access the JA8 2016 submittal template once they acknowledge that their certification is for Title 24. Instructions for submitting Title 24 appliance data for high-efficacy light sources and the submittal template can be found on the [Energy Commission's website](#)

[Energy Code Ace](#) offers [free, on-demand video trainings](#) detailing how to certify products to the Energy Commission, step by step. These trainings are focused on the compliance and certification essentials industry professionals need to know and understand. Also see the Energy Code Ace [Title 20 Certification Overview, Process and FAQs fact sheet](#) for a summary of the certification process.

Frequently Asked Questions

Q: *How do I show compatibility with a dimmer type? Do manufacturers need to test products with every potential dimmer they could be used with?*

A: No, light sources are only required to be tested with one physical dimmer, per dimmer type that is claimed as compatible. Dimmer types include:

- Forward phase-cut control
- Reverse phase-cut controls
- 0-10 volt control
- Digital controls
- Powerline carrier controls
- Wireless controls

If a product is certified to the Energy Commission as being compatible only with reverse phase cut dimmers, it only needs to be tested with one reverse phase cut dimmer, of the manufacturer's choosing. If a product is certified as being compatible with two dimmer types, for example reverse phase cut and forward phase cut, it must be tested with a minimum of one reverse phase cut and one forward phase cut dimmer.

Products certified as compliant with forward phase cut dimmers must be tested with a NEMA SSL7A dimmer (Type 1 or Type 2) of the manufacturer's choosing.

Q: *How do manufacturers process the raw flicker data collected via the [JA10 test procedure](#), in order to obtain percent flicker values only occurring at frequencies less than 200 Hz?*

A: The [JA10 test procedure](#) describes a method of filtering the raw high frequency photometric data for use in calculating the percent flicker values for various cut off frequencies required for reporting in JA10 ("Conduct a Fourier analysis to transform data for each dimming level into the frequency domain") – this includes cut off frequencies of 40 Hz, 90 Hz, 200 Hz, 400 Hz and 1,000 Hz. The manufacturer or test lab can use their own software to filter the data but they must perform the data processing and calculations in accordance with the detailed requirements outlined in section [JA10.6](#) of [JA10](#).

Related Lighting Standards

[JA8](#) focuses on performance and lighting quality to increase consumer retention of high efficacy lighting. [JA8](#) is a technology-neutral specification; any technology capable of meeting the requirements can be certified to the Energy Commission. The [JA8](#) requirements are similar to two other California LED lamp quality and performance specifications:

- [Voluntary California Quality Light-Emitting Diode \(LED\) Specification](#)
 - This voluntary specification is used for rebate eligibility and applies to a smaller set of product types than [JA8](#), but the requirements are almost identical to the requirements in [JA8](#).
- [Title 20 Appliance Efficiency Regulations for LEDs](#) (effective January 2018 (tier 1) and July 2019 (tier 2))
 - The Title 20 standards for LED lamps do not cover as many quality metrics as [JA8](#), and some of the quality requirements are not as stringent as [JA8](#). Products can be designed to meet both set of requirements.

For More Information

Primary Documents

- Energy Standards Section 100.1 – Definitions and Rules of Construction
energycodeace.com/site/custom/public/reference-ace-2016/Documents/section1001definitionsandrulesofconstruction.htm
- Energy Standards Sections 110.9 – Mandatory Requirements for Lighting Control Devices and Systems, Ballasts, and Luminaries
energycodeace.com/site/custom/public/reference-ace-2016/Documents/section1109mandatoryrequirementsforlightingcontroldevicesandsyst.htm
- Energy Standards Section 130.0 – Lighting Systems and Equipment and Electrical Power Distribution Systems
energycodeace.com/site/custom/public/reference-ace-2016/Documents/section1300lightingsystemsandequipmentandelectricalpowerdistribu.htm
- Energy Standards Section 150.0(k) – Mandatory Features and Devices
energycodeace.com/site/custom/public/reference-ace-2016/Documents/section1500mandatoryfeaturesanddevices.htm
- Energy Standards Joint Appendix JA1 – Glossary
energycodeace.com/site/custom/public/reference-ace-2016/Documents/appendixja1glossary.htm
- Energy Standards Joint Appendix JA8 – Qualification Requirements for High Efficacy Light Sources
energycodeace.com/site/custom/public/reference-ace-2016/Documents/appendixja8qualificationrequirementsforhighefficacylightsources.htm
- Energy Standards Joint Appendix JA10 – Test Method for Measuring Flicker of Lighting Systems and Reporting Requirements
energycodeace.com/site/custom/public/reference-ace-2016/Documents/appendixja10testmethodformeasuringflickeroflightingsystemsandrep.htm
- 2016 Title 20 Appliance Efficiency Regulations:
[govt.westlaw.com/calregs/Browse/Home/California/CaliforniaCodeofRegulations?guid=I8F8F3BC0D44E11DEA95CA4428EC25FA0&originationContext=documenttoc&transitionType=Default&contextData=\(sc.Default\)](http://govt.westlaw.com/calregs/Browse/Home/California/CaliforniaCodeofRegulations?guid=I8F8F3BC0D44E11DEA95CA4428EC25FA0&originationContext=documenttoc&transitionType=Default&contextData=(sc.Default))
- Voluntary California Quality Light-Emitting Diode (LED) Lamp Specification
energy.ca.gov/appliances/led_lamp_spec/

California Energy Commission Information & Services

Title 24, Part 6

- Energy Standards Hotline: 1-800-772-3300 (Free) or Title24@energy.ca.gov
- Online Resource Center:
energy.ca.gov/title24/orc/
 - The Energy Commission’s main web portal for Energy Standards, including information, documents, and historical information
- JA8 Compliance for Test Laboratories Fact Sheet:
energy.ca.gov/2016publications/CEC-400-2016-018/CEC-400-2016-018-FS.pdf
- Instructions for Submitting High-Efficacy Light Sources for Title 24 Appliance Data
[energy.ca.gov/appliances/database/forms_instructions_cert/Lighting_Products/2016%20JA8%20High%20Efficacy%20Lighting%20\(JEFF\).zip](http://energy.ca.gov/appliances/database/forms_instructions_cert/Lighting_Products/2016%20JA8%20High%20Efficacy%20Lighting%20(JEFF).zip)
- Modernized Appliance Efficiency Database (MAEDBS):
<https://cacertappliances.energy.ca.gov/Login.aspx>

Additional Resources

- California Lighting Technology Center (CLTC) Guides:
 - Residential Lighting: What’s New in the 2016 Title 24, Part 6 Code?
cltc.ucdavis.edu/publication/2016-title-24-code-changes-residential
 - Residential Lighting: A guide to meeting or exceeding California’s 2016 Building Energy Efficiency Standards
cltc.ucdavis.edu/publication/residential-lighting-design-guide-2016-standards
 - Energy Code Ace:
EnergyCodeAce.com
 - An online “one-stop-shop” providing free resources and training to help appliance and building industry professionals decode and comply with Title 24, Part 6 and Title 20. The site is administered by California’s investor-owned utilities.
Of special interest:
 - Report: Sample MATLAB Fourier Low Pass Filter Routine
energycodeace.com/download/17579/file_path/fieldList/Report.BP.JA10%20Sample%20MATLAB%20Command.zip
 - Fact Sheets
energycodeace.com/content/resources-fact-sheets/
 - JA10 Flicker – Fourier Transform
 - Residential Indoor & Outdoor Lighting Fact Sheet
 - Title 20 Certification Overview, Process and FAQs
 - Title 20 Lighting FAQs
 - Title 20 On-Demand Video Training:
energycodeace.com/content/title-20-training/
- Please register with the site and select an industry role for your profile in order to receive messages about all our free offerings!



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