

New Testing and Certification Requirements

On January 1, 2020, updated residential lighting requirements became effective in California's 2019 Title 24, Part 6 Building Energy Efficiency Standards (Energy Code or Title 24, Part 6). As in the 2016 code cycle, the 2019 Energy Code requires high efficacy lighting throughout newly constructed homes and for residential lighting additions and alterations that require a building permit submittal. Energy Code [Table 150.0-A](#) lists a variety of light sources classified as "high efficacy" for compliance with Energy Code [Section 150.0\(k\)](#).

This includes luminaires containing light sources that meet the performance requirements outlined in [Energy Code Joint Reference Appendix JA8 \(JA8\)](#), Qualification Requirements for High Efficacy Light Sources. [JA8](#) high efficacy light sources must also meet flicker testing and data reporting requirements in [Joint Reference Appendix JA10 \(JA10\)](#), Test Method for Measuring Flicker of Lighting Systems and Reporting Requirements.

To qualify as a [JA8](#) high efficacy light source for compliance with [Section 150.0\(k\)](#) of the 2019 Energy Code, 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. 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

2019 California Building Energy Efficiency Standards, Title 24, Part 6:

- [Section 100.1](#) – Definitions and Rules of Construction
- [Section 110.0](#) – Systems and Equipment - General
- [Section 110.1](#) – Mandatory Requirements for Appliances
- [Section 110.9](#) – Mandatory Requirements for Lighting Controls
- [Section 130.0](#) – Lighting Systems and Equipment and Electrical Power Distribution Systems
- [Section 150.0\(k\)](#) – Residential Lighting
- [Joint Reference Appendix JA1](#) – Definitions
- [Joint Reference Appendix JA8](#) – Qualification Requirements for High Efficacy Light Sources
- [Joint Reference 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. Residential lighting additions and alterations that require building permit submittals must also be high efficacy. 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, dormitory and senior-housing buildings, as well as hotel and motel guest rooms.
- The definition of “high efficacy” allows 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. (see recessed downlight exception below)
 - There is no requirement for [JA8](#) light sources to be shipped with fixtures (i.e., “bulb-in-a-box” approach.) [JA8](#) sources / lamps may 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](#)-2019” or “[JA8](#)-2016” or, for products intended to be used in enclosed or recessed luminaires, “[JA8](#)-2019-E” or “[JA8](#)-2016-E.”
 - Products installed in recessed or enclosed luminaires must contain the “[JA8](#)-2019-E” or “[JA8](#)-2016-E” (rated at elevated temperatures) marking.
- New 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.

Qualifying as High Efficacy

TABLE 150.0-A CLASSIFICATION OF HIGH EFFICACY LIGHT SOURCES

High Efficacy Light Sources

Light sources shall comply with one of the columns below:

<p>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.</p>	<p>Light sources in this column are only considered to be high efficacy if they are certified to the Commission as High Efficacy Light Sources in accordance with Reference Joint Appendix JA8 and be marked as required by JA8.</p>
<ol style="list-style-type: none"> 1. Pin-based linear fluorescent or compact fluorescent light sources using electronic ballasts. 2. Pulse-start metal halide light sources. 3. High pressure sodium light sources. 4. Luminaires with hardwired high frequency generator and induction lamp. 5. LED light sources installed outdoors. 6. Inseparable SSL luminaires containing colored light sources that are installed to provide decorative lighting. 	<ol style="list-style-type: none"> 7. All light sources installed 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. 8. Any light source not otherwise listed in this table.

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 2019 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 reversephase 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](#).

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 very similar 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. With the 2019 Energy Code, the CRI was revised to align with the Title 20 requirement (82 CRI for Title 20 lamps)

Title 20 versus Title 24, Part 6 JA8: Key Differences

Title 24, Part 6 JA8 (2019)		General Service LED Lamps (Tier 2)	Small Diameter Directional Lamps
			
Effective Date	January 1, 2020	July 1, 2019	July 1, 2019
Base Type	All (Except Night Lights)	E12, E17, E26 and GU-24	ANSI ANSLG C81.61-2009 or E26
Power Factor	≥ 0.9	≥ 0.7	No Requirement
Start Time	≤ 0.5 seconds	No Requirement	
Lifetime	≥ 15,000 hours	≥ 10,000 hours	≥ 25,000 hours
Dimming	≤ 10 %	No Requirement	
Efficacy	≥ 45 lm/W	≥ 80 lm/W and (2.3 x CRI) + lm/W) ≥ 297	≥ 80 lm/W Or ≥ 70 lm/W and (lm/W + CRI ≥ 165)
CCT	≤ 4,000 K	No Requirement	
Chromaticity	-0.0033 ≤ Duv ≤ 0.0033	ANSI C78.377-2015 Compliant	No Requirement
CRI	≥ 90 ≥ 82 for T20 lamps	≥ 82	No Requirement
R1-R9	R9: ≥ 50	R1-R8: ≥ 72	No Requirement
Standby Power	No Requirement	≤ 0.2 W	No Requirement

For More Information

Primary Documents

- Energy Code Section 100.1 – Definitions and Rules of Construction
energycodeace.com/site/custom/public/reference-ace-2019/index.html#!Documents/section1001definitionsandrulesofconstruction.htm
- Energy Code Section 110.0 – Systems and Equipment - General
energycodeace.com/site/custom/public/reference-ace-2019/Documents/section1100systemsandequipmentgeneral.htm
- Energy Code Section 110.1 – Mandatory Requirements for Appliances
energycodeace.com/site/custom/public/reference-ace-2019/Documents/section1101mandatoryrequirementsforappliances.htm
- Energy Code Section 110.9 – Mandatory Requirements for Lighting Controls
energycodeace.com/site/custom/public/reference-ace-2019/index.html#!Documents/section1109mandatoryrequirementsforlightingcontrols.htm
- Energy Code Section 130.0 – Lighting Systems and Equipment and Electrical Power Distribution Systems
energycodeace.com/site/custom/public/reference-ace-2019/index.html#!Documents/section1300lightingsystemsandequipmentandelectricalpowerdistribu.htm
- Energy Code Section 150.0(k) – Mandatory Features and Devices
energycodeace.com/site/custom/public/reference-ace-2019/index.html#!Documents/section1500mandatoryfeaturesanddevices.htm
- Energy Code Table 150.0-A: Classification of High Efficacy Light Sources
energycodeace.com/site/custom/public/reference-ace-2019/index.html#!Documents/section1500mandatoryfeaturesanddevices.htm
- Energy Code Joint Reference Appendix JA1 – Definitions
energycodeace.com/site/custom/public/reference-ace-2019/index.html#!Documents/appendixja1definitions.htm
- Energy Code Joint Reference Appendix JA8 – Qualification Requirements for High Efficacy Light Sources
energycodeace.com/site/custom/public/reference-ace-2019/index.html#!Documents/appendixja8qualificationrequirementsforhighefficacylightsources1.htm
- Energy Code Joint Reference Appendix JA10 – Test Method for Measuring Flicker of Lighting Systems and Reporting Requirements
energycodeace.com/site/custom/public/reference-ace-2019/index.html#!Documents/appendixja10testmethodformeasuringflickeroflightingsystemsandrep.htm
- Title 20 Appliance Efficiency Regulations:
[govt.westlaw.com/calregs/Browse/Home/California/CaCaliforniaCodeofRegulations?guid=I8F8F3BC0D44E11DEA95CA4428EC25FA0&originationContext=documenttoc&transitionType=Default&contextData=\(sc.Default\)](http://govt.westlaw.com/calregs/Browse/Home/California/CaCaliforniaCodeofRegulations?guid=I8F8F3BC0D44E11DEA95CA4428EC25FA0&originationContext=documenttoc&transitionType=Default&contextData=(sc.Default))
- Voluntary California Quality Light-Emitting Diode (LED) Lamp Specification
www.energy.ca.gov/2015publications/CEC-400-2015-001/CEC-400-2015-001.pdf

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/programs-and-topics/programs/building-energy-efficiency-standards/online-resource-center
 - The Energy Commission’s main web portal for Energy Code, including information, documents and historical information
- JA8 Compliance for Test Laboratories Fact Sheet:
www.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
www.energy.ca.gov/filebrowser/download/657
- 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 2019 Title 24, Part 6 Code?
cltc.ucdavis.edu/publication/residential-lighting-whats-new-2019-title-24-part-6-energy-code
 - What’s New in Title 20 Code? Lighting Appliance Efficiency Regulations
cltc.ucdavis.edu/publication/title-20-lighting-appliance-efficiency
- 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
- Application Guide
energycodeace.com/content/resources-ace/file_type=application-guide
 - Residential Lighting 2019
- 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/

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