

Introduction

Both California's Appliance Efficiency Regulations (Title 20) and the California Building Energy Efficiency Standards (Title 24, Part 6 or Energy Code) include requirements for lamps and luminaires (light fixtures), including the performance requirements outlined in Title 24, Part 6 Joint Reference Appendix JA8 (JA8), [Qualification Requirements for High Efficacy Light Sources](#). Title 20 requirements apply to covered lighting products when they are sold or offered for sale in California. On the other hand, Title 24, Part 6 applies to new construction, permitted retrofits and building alterations and requires all luminaires in new single-family homes, townhouses and dwelling units of new multifamily buildings to be high efficacy. One way to demonstrate that a lighting product is high efficacy is to be certified and marked as JA8 compliant.

Though there is significant overlap between some of the Title 20 lamp standards and the JA8 requirements, JA8 is only required for products being installed into newly constructed buildings or as part of an alteration project. Lamps with the JA8 marking on them can be purchased separately from the luminaire as long as the JA8-marked lamps are installed in the luminaires prior to inspection by the building department.

All luminaires (indoor and outdoor) must comply with Table 150.0-A, and outdoor luminaires have some additional control requirements. Title 20 standards apply to specific types of lamps regardless of whether they will be used indoors or outdoors. However, there are some exemptions and requirements that are specific to certain outdoor lamps.

This fact sheet is intended to clarify where these two standards overlap, where they are different and when each is applicable. It primarily focuses on general service lamps (GSLs), small-diameter directional lamps (SDDLs), and state-regulated LEDs (SLEDs). Other [Energy Code Ace fact sheets](#) exist that provide an overview of both Title 20 lamp standards and JA8 residential lighting standards independently.

Relevant Code Sections

California Appliance Efficiency Regulations, Title 20

- [Section 1602\(k\)](#) – Definitions: Lamps
- [Section 1604\(k\)](#) – Test Methods for Lamps
- [Section 1605.3\(k\)\(2\)](#) – Standards for State-Regulated LED Lamps and General Service Lamps
- [Section 1607](#) – Marking of Appliances

2016 California Building Energy Code, Title 24, Part 6

- [Section 110.0](#) – Systems and Equipment - General
- [Section 110.1](#) – Mandatory Requirements for Appliances
- [Section 110.9\(e\)](#) – Mandatory Requirements for Lighting Control Devices and Systems, Ballasts, and Luminaires: JA8 High Efficacy Light Sources
- [Section 130.0\(b\)](#) – Lighting Systems and Equipment and Electrical Power Distribution Systems
- [Section 150.0\(k\)](#) – Mandatory Features and Devices: Residential Lighting
- [Joint Reference Appendix JA8 \(JA8\)](#) – Qualification Requirements for High Efficacy Light Sources
- [Joint Reference Appendix JA10 \(JA10\)](#) – Test Method for Measuring Flicker of Lighting Systems and Reporting Requirements

2019 California Building Energy Code, Title 24, Part 6

- [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\(b\)](#) – Lighting Systems and Equipment and Electrical Power Distribution Systems
- [Section 150.0\(k\)](#) – Mandatory Features and Devices: Residential Lighting
- [Joint Reference Appendix JA8 \(JA8\)](#) – Qualification Requirements for High Efficacy Light Sources
- [Joint Reference Appendix JA10 \(JA10\)](#) – Test Method for Measuring Flicker of Lighting Systems and Reporting Requirements

SLEDs

SLEDs are lamps capable of producing light with Duv between -0.012 and 0.012, and that have an E12, E17, E26 or GU24 base, including LED lamps that are designed for retrofit within existing recessed can housings that contain one of the preceding bases. SLEDs do not include lamps with a brightness of more than 2,600 lumens or those that cannot produce light with a correlated color temperature of 2200K - 7000K.



Key Differences

One of the key differences between the Title 20 lamp standards and the JA8 requirements is the way they are applied and enforced in the market. Table 1 outlines these differences.



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Title 20	Key Differences	Title 24, Part 6 JA8
Manufactured on or after January 1, 2018	Effective Dates	2016 Energy Code: Construction projects permitted on or after January 1, 2017 2019 Energy Code: Construction projects permitted on or after January 1, 2020
Applies to a specific set of lamp types when they are sold or offered for sale in California Applies to all projects	Applications	Applies to a specific set of building applications that are going through the Energy Code building inspection process <ul style="list-style-type: none"> • Single-family homes, townhouses, and dwelling units of new multifamily buildings • 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 Applies to permitted new construction, alterations and additions only (e.g., not simply changing light bulbs in a home)
Lamps within scope must be certified to the Energy Commission's Modernized Appliance Efficiency Database System (MAEDbS) using the appropriate Title 20 appliance type in order to be legally sold or offered for sale in California	Requirements	Residential spaces pulling a building permit must have high-efficacy light sources installed at the time of building inspection Eligible high-efficacy light sources are those light sources listed in Table 150-A of 2016 and 2019 Title 24, Part 6 Lamps must be certified to the Energy Commission's MAEDbS under the Title 24 section using the JA8 appliance category
Retailers, manufacturers, contractors, importers and distributors must ensure the products they sell or offer for sale in California are certified to the MAEDbS	Who's Responsible?	Manufacturers must certify JA8-compliant lamps to the MAEDbS Designers and builders must ensure that the products they specify in permitted projects are high-efficacy sources that can be installed If they are specifying JA8 products to meet this requirement, the builders must ensure they are specifying products marked as "JA8" in the MAEDbS

Table 1: Key Differences Between Title 20 and Title 24, Part 6 JA8 Requirements: Application & Enforcement

The two standards also have differences in their technical requirements and scope. Table 2 outlines the key differences between JA8 requirements and the Title 20 lighting standards that became effective January 1, 2018.

	Title 20			Title 24, Part 6 JA8
	State-regulated LED Lamps	Small-Diameter Directional Lamps	General Service Lamps	Permitted Residential, Non-legacy High Efficacy
Effective Date	January 1, 2018 (Tier 1)	January 1, 2018	January 1, 2018	2016 Energy Code: January 1, 2017
	July 1, 2019 (Tier 2)			2019 Energy Code: January 1, 2020
Definition	For the precise definition of each of these Title 20 lamp categories, please refer to Title 20, Section 1602(k) Approximate definitions provided here:			See Table 150.0-A for specific light sources that must be certified JA8 Once certified, the light source can be used by builders to comply with the 2016 or 2019 Title 24, Part 6 requirement that permitted residential spaces have all high-efficacy lighting (excludes night lights)
	LED lamps and retrofit kits capable of producing light with Duv between -0.012 and 0.012, with base types E12, E17, E26 or GU24, that produce whitelight 200-2,600 lumens (150-2,600 lumens for candelabra lamps), and produce light with a correlated color temperature between 2200 K and 7000 K	Non-tubular directional lamps (of any source technology) with diameter $\leq 2.25"$ and an ANSI pin base or E26 base, designed to operate at 12V, 24V or 120V and ≤ 850 lumens or $\geq 75W^1$	Incandescent, halogen, CFL and LED general service lamps that have a medium screw base, wattage between 25W and 150W and voltage 110-130V Certain specialty lamps are exempted	
Power Factor	≥ 0.7	No Requirement	No Requirement	≥ 0.9
Start Time	No Requirement	No Requirement	No Requirement	≤ 0.5 seconds
Lifetime	$\geq 10,000$ hours	$\geq 25,000$ hours	$\geq 1,000$ hours	$\geq 15,000$ hours
Lumen Maintenance	No Requirement	No Requirement	No Requirement	2016 Energy Code: ≥ 86.7 after 6,000 hr test, or $\geq 25,000$ hours LM80 and TM21 projection for inseparable SSL luminaires
				2019 Energy Code: ≥ 86.7 after 6,000 hr test or ≥ 93.1 after 3,000 hr test Sources tested using LM-80 and TM-21 may use the ENERGY STAR [®] TM-21 calculator
Dimming	If dimming is claimed, the lamp must dim to 10% Must be dimmable in order to include marketing that makes comparisons to incandescent lamps	No Requirement	No Requirement	All lamps must dim to 10% Must be compatible with forward phase cut control, reverse phase cut, powerline carrier or 0-10 VDC dimming controls
Flicker	If dimming is claimed, it also must meet the low flicker operation requirements (and noise requirements)	No Requirement	No Requirement	All lamps must meet the low flicker operation requirements
Efficacy²	≥ 68 lumens/watt (Tier 1)	≥ 70 lumens/watt	≥ 45 lumens/watt	≥ 45 lumens/watt
	≥ 80 lumens/watt (Tier 2)			
CRI	≥ 82	No Requirement	≥ 80 (nonmodified spectrum lamps; ≥ 75 modified spectrum lamps)	≥ 90
Correlated Color Temperature	No Requirement	No Requirement	No Requirement	2016 Energy Code: Inseparable SSL luminaires, LED light engines and GU24 LED lamps: $\leq 4,000$ Kelvin Other sources: $\leq 3,000$ Kelvin
				2019 Energy Code: All light sources $\leq 4,000$ Kelvin

	State-regulated LED Lamps	Small-Diameter Directional Lamps	General Service Lamps	Permitted Residential, Non-legacy High Efficacy
Correlated Color Temperature	No Requirement	No Requirement	No Requirement	2016 Energy Code: Inseparable SSL luminaires, LED light engines and GU24 LED lamps: ≤4,000 Kelvin Other sources: ≤3,000 Kelvin 2019 Energy Code: All light sources ≤4,000 Kelvin
Chromaticity	ANSI C78.377-2015 Compliant	No Requirement	No Requirement	2016 Energy Code: ≥ -0.0033 and ≤ +0.0033 2019 Energy Code: No Requirement
R1-R8	≥72	No Requirement	No Requirement	No Requirement
R9	No Requirement	No Requirement	No Requirement	≥50
Survival Rate	No Requirement	No Requirement	No Requirement	90% survival for a ten-lamp (or larger) sample group 100% survival otherwise
Ambient or Elevated Temperature Test (For Rated Life, Lumen Maintenance, & Survival Rate)	No Requirement	No Requirement	No Requirement	2016 Energy Code: Ambient temperature test allowed only for omnidirectional lamps <10W, decorative lamps or lamps labeled "not for use in enclosed fixtures," lamps and light engines labeled "not for use in recessed fixtures," and inseparable SSL luminaires All others must complete elevated temperature test
				2019 Energy Code: Light sources tested using the ENERGY STAR Product Specification for Lamps Version 2.1 may perform either the Ambient Temperature Life Test Method or the Elevated Temperature Life Test Method
Light Distribution Requirement	Omnidirectional lamps (A-lamps): ENERGY STAR Lamps Version 2.0 requirements	No Requirement	No Requirement	No Requirement
	Decorative lamps (B, BA, C, CA, F or G): ENERGY STAR Lamps Version 1.1 requirements			
MAEDbS Listing Requirements	Any entity conducting testing on appliances to be listed in the MAEDbS must meet the requirements of Section 1603(a) and be approved by the Energy Commission Also, such testing may be conducted by an "Approved Industry Certification Program" who fulfills the requirements of Title 20, Section 1603(b) Requirements for listing appliances in the MAEDbS are located in Section 1606 Any third-party certifier intending to list appliances in the MAEDbS must also meet the requirements of Section 1606(f) Entities approved to submit data to the MAEDbS may submit manually or in Excel spreadsheet batches			Test lab must be participating in the ISO/IEC 17025 NVLAP or other laboratory accreditation body operating in accordance with ISO/IEC 17011 (See JA8.2)
Product Labeling Requirements	Complete marking requirements are found in Title 20, Section 1607 Lamp products must include manufacturer's name, brand name, or trademark, model number, and date of manufacture, including year and month or smaller increment This information must be permanently, legibly and conspicuously displayed on an accessible place on each unit, on the unit's packaging or, where the unit is contained in a group of several units in a single package, on the packaging of the group, in compliance with Title 20, Sections 1607(b) and 1607(c)(2) Title 20, Section 1607(d)(13) includes additional requirements for SLEDs making claims of dimmability and/or comparisons to incandescent lamps			Light sources that meet Elevated Temperature Life Test must be marked with "JA8-2016-E" or "JA8-2019-E," which means they are for use in enclosed fixtures
				Other light sources that meet JA8 requirements are marked with "JA8-2016" or "JA8-2019"

Table 2: Key Differences Between Title 20 and Title 24, Part 6 JA8 Technical Requirements & Scope

- 1 State-regulated small diameter directional lamps do not include directional lamps with an E26 base that use LEDs and are covered under the definition of state-regulated Light Emitting Diode Lamps.
- 2 SLEDs and SDDLs have minimum requirements for both efficacy and CRI. SLED requirements for efficacy: 68 lumens/watt with a minimum compliance score of 282. (The compliance score is the sum of the efficacy and 2.3 times the CRI of a lamp.) SDDL requirements for efficacy: either 80 lumens/watt or 70 lumens/watt with a minimum compliance score of 165. (Compliance score is the sum of efficacy and CRI.)

Table 3 provides some examples of which light sources and applications must comply with Title 20 and/or JA8 requirements.

Light Source Type & Application	Must Meet JA8?	Must Meet Title 20?
LED light engine or integral solid state luminaire installed in residential new construction	✓	⊘*
Screw based A-lamp being installed in residential new construction or permitted alteration	✓	✓
Screw based A-lamp being sold through retail (not installed in residential new construction project)	⊘	✓
MR16 lamp being sold through retail (not installed in residential new construction project)	⊘	✓
Recessed downlight luminaires installed in ceiling for residential permitted project (must be labeled JA8-2016-E or JA8-2019-E for elevated temperature; recessed fixtures are not allowed to have screw based sockets in residential new construction)	✓	⊘

Table 3: Compliance Examples

* Title 20 has requirements for portable luminaires with LED light engines, however, they are usually installed after permit closeout.

Your Role

Understanding your role in the compliance chain may be difficult. Figure 1 illustrates the role of each market actor in the Title 20 and Title 24, Part 6 lamp compliance process.

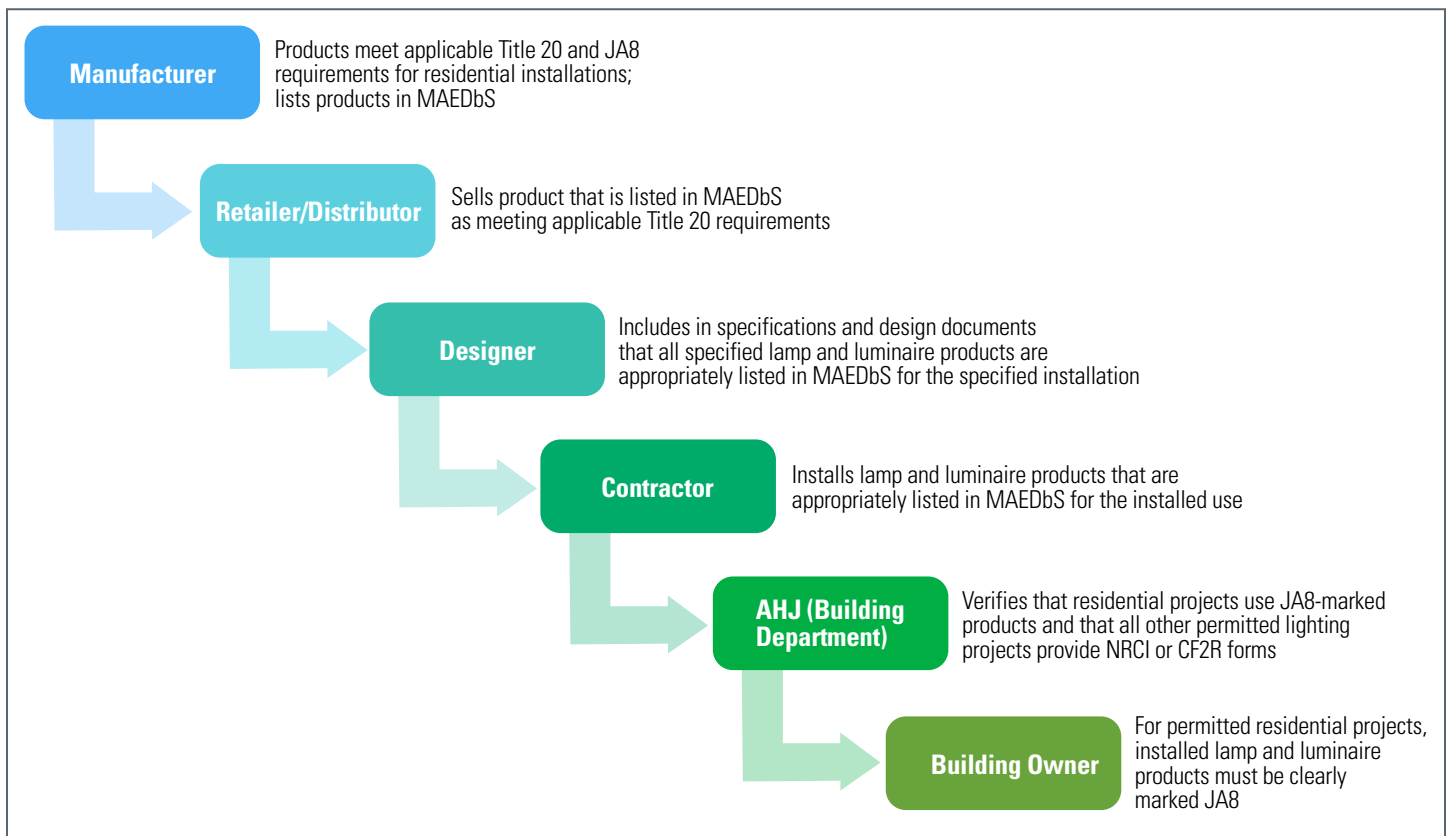


Figure 1: Lamp Compliance Chain Roles

For More Information

Primary Documents

2019 California Building Energy Code, Title 24, Part 6

- 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/Documents/section1109mandatoryrequirementsforlightingcontrols.htm
- Energy Code Section 130.0(b) – Lighting Systems and Equipment and Electrical Power Distribution Systems energycodeace.com/site/custom/public/reference-ace-2019/Documents/section1300lightingsystemsandequipmentandelectricalpowerdistribu.htm
- Energy Code Section 150.0(k) – Mandatory Features and Devices energycodeace.com/site/custom/public/reference-ace-2019/Documents/section1500mandatoryfeaturesanddevices.htm
- Energy Code Reference Joint Reference Appendix JA8 – Qualification Requirements for High Efficacy Light Sources energycodeace.com/site/custom/public/reference-ace-2019/Documents/appendixja8qualificationrequirementsforhighefficacylightsources.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/Documents/appendixja10testmethodformeasuringflickeroflightingsystemsandrep.htm

2016 California Building Energy Code, Title 24, Part 6

- Energy Code Section 110.0 – Systems and Equipment - General energycodeace.com/site/custom/public/reference-ace-2016/index.html#!Documents/section1100systemsandequipmentgeneral.htm
- Energy Code Section 110.1 – Mandatory Requirements for Appliances energycodeace.com/site/custom/public/reference-ace-2016/Documents/section1101mandatoryrequirementsforappliances.htm
- Energy Code Section 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 Code Section 130.0(b) – Lighting Systems and Equipment and Electrical Power Distribution Systems energycodeace.com/site/custom/public/reference-ace-2016/Documents/section1300lightingsystemsandequipmentandelectricalpowerdistribu.htm
- Energy Code Section 150.0(k) – Mandatory Features and Devices energycodeace.com/site/custom/public/reference-ace-2016/Documents/section1500mandatoryfeaturesanddevices.htm
- Energy Code Joint Reference Appendix JA8 – Qualification Requirements for High Efficacy Light Sources energycodeace.com/site/custom/public/reference-ace-2016/Documents/appendixja8qualificationrequirementsforhighefficacylightsources.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-2016/Documents/appendixja10testmethodformeasuringflickeroflightingsystemsandrep.htm

California Title 20 Appliance Efficiency Regulations

- Title 20 Appliance Efficiency Regulations: energycodeace.com/content/reference-ace-t20-tool
- Section 1602(k) – Definitions: Lamps energycodeace.com/site/custom/public/reference-ace-t20/index.html#!Documents/section1602definitions.htm#klamps.htm
- Section 1604(k) – Test Methods for Lamps energycodeace.com/site/custom/public/reference-ace-t20/index.html?topiconly=true#!Documents/section1604testmethodsforspecificappliances.htm
- Section 1605.3(k)(2) – Standards for State-Regulated General Service Lamps energycodeace.com/site/custom/public/reference-ace-t20/index.html?topiconly=true#!Documents/section16053statestandardsfornonfederallyregulatedappliances.htm
- Section 1607 – Marking of Appliances energycodeace.com/site/custom/public/reference-ace-t20/index.html?topiconly=true#!Documents/section1607markingofappliances.htm

California Energy Commission Information & Services

- Energy Code 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 the Energy Code, including information, documents, and historical information
- Appliances Call Center: (888) 838-1467 or outside California (916) 651-7100
- Questions may also be emailed to Appliances@energy.ca.gov
- California Appliance Efficiency Standards Site:
energy.ca.gov/rules-and-regulations/appliance-efficiency-regulations-title-20/appliance-regulations-certification
- JA8 Compliance for Test Laboratories Fact Sheet:
ww2.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/sites/default/files/2020-03/MAEDBS_General_Instructions_ADA.pdf
- 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: What’s New in 2019 Title 24, Part 6 Energy Code?
cltc.ucdavis.edu/publication/residential-lighting-whats-new-2019-title-24-part-6-energy-code
- 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:

- Fact Sheets
energycodeace.com/content/resources-fact-sheets/
 - Residential Lighting
 - Title 20 Certification Overview, Process and FAQs
 - Title 20 Lighting FAQs
 - Residential High-Efficacy Lighting for Manufacturers
 - Residential High-Efficacy Lighting – JA10 Flicker – Fourier Transform
- Residential Lighting Application Guide
energycodeace.com/content/resources-ace/file_type=application-guide
- Report: Sample MATLAB Fourier Low Pass Filter Routine
energycodeace.com/download/17579/file_path/fieldList/Report.BP.JA10%20Sample%20MATLAB%20Command.zip
- Title 20 On-Demand Video Training
energycodeace.com/content/title-20-training/

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