

Lighting the Way to Efficiency

Requirements for State-Regulated LED Lamps, Small Diameter Directional Lamps and General Service Lamps

California state-regulated LED lamps (SLED), small diameter directional lamps (SDDL), and general service lamps (GSL) manufactured on or after January 1, 2018 are required to comply with the performance, testing and marking requirements listed in Sections 1601 through 1609 of [California's Appliance Efficiency Regulations \(Title 20\)](#). Compliance also includes mandatory certification of the regulated products to the California Energy Commission (Energy Commission). Certified products appear on the Energy Commission's [Modernized Appliance Efficiency Database System \(MAEDbS\)](#), a publicly-available database that lists all regulated products that are legally allowed to be sold or offered for sale in California.

Why Regulate Lamps?

The lighting requirements in Title 20 are paving the path forward to an energy-efficient California that is brightly lit by quality LEDs. LED lamps are now more widely available in the market, offering comparable, cost-effective performance for significantly less energy. These LED replacement lamps use as little as one-sixth of the energy of incandescent lamps, and the efficiency of LEDs continues to improve rapidly. Average LED efficacy has also surpassed that of compact fluorescent lamps (CFLs).



Relevant Code Sections

California Appliance Efficiency Regulations, Title 20

- Section 1602 – Definitions
- Section 1604(k) – Test Methods for Lamps
- Section 1605.3(k)(2)(A) & (B) – Standards for State-Regulated General Service Lamps
- Section 1605.3(k)(2)(C) – Standards for State-Regulated LED Lamps
- Section 1605.3(k)(3) – Standards for State-Regulated Small Diameter Directional Lamps
- Section 1606 – Filing by Manufacturers; Listing of Appliances in Database
- Section 1607(b), 1607(c)(2) & 1607(d)(13) – Marking of Appliances

Voluntary Quality LED Lamp Certification

As of January 1, 2017, SLEDs may be voluntarily certified to the Tier I of the Voluntary California Quality LED Lamp Specification Version 3.0.

SLEDs can also be voluntarily certified to Tier II of the Version 3.0 Specification.

Qualifying lamps may be listed in MAEDbS by selecting the "V – Voluntary" option when inputting the regulatory status.



State-Regulated Light-Emitting Diode Lamp (SLED)

The following are the types of SLEDs that are regulated by Title 20. A lamp must meet all these requirements to be considered a SLED:

- Lamps with an American National Standards Institute (ANSI) E12, E17, E26 or GU-24 base
- Lamps that are capable of brightness between 200 lumens (150 lumens for candelabra bases) and 2,600 lumens
- Lamps capable of producing white light with a color correlated temperature (CCT) between 2,200 and 7,000 K
- Lamps with a Duv ± 0.012 (chromaticity as defined in ANSI C78.377)
- Lamps used in retrofit kits, which are products designed to retrofit existing recessed can housings that contains one of the preceding bases

In addition to the requirements above and those shown in Table 1 below, lamps must also meet the following performance and testing requirements found in Title 20 Sections 1605.3(k)(2)(C) and 1604(k), respectively:

- A color point that meets the requirements in Table 1 of Annex B of ANSI C78.377-2015 for chromaticity and color consistency
- A Color Rendering Index (CRI) (Ra) of 82 or greater
- Individual color scores of R1, R2, R3, R4, R5, R6, R7 and R8 of 72 or greater
- A power factor of 0.7 or greater
- A rated life of 10,000 hours or greater as determined by the lumen maintenance and time to failure test procedure
- A minimum light distribution requirement:
 - SLEDs that have an ANSI standard lamp shape of A: the omnidirectional light distribution requirements of the ENERGY STAR® Product Specification for Lamps Version 2.0 (December 2015)
 - SLEDs that have an ANSI standard lamp shape of B, BA, C, CA, F or G: the decorative light distribution requirements of ENERGY STAR's Product Specification for Lamps Version 2.0 (December 2015)
 - There are no light distribution requirements for other lamp shapes
- The test method for SLEDs is IES LM-79-08 with additional requirements in 80 Fed. Reg. 39665-39667 (July 9, 2015) section 430.23(ee)(Appendix BB to Subpart B of Part 430)
- For certification, compliance and enforcement purposes, the sampling provisions in 80 Fed. Reg 39664-39665 must be used
- The testing, performance and marking requirements for SLEDs can be found in Title 20 Sections 1604(k), 1605.3(k)(2)(C) and 1607, respectively. SLEDs have additional requirements in 1607d(13)

State-Regulated Small Diameter Directional Lamp (SDDL)

A state-regulated SDDL is a non-tubular directional lamp with a diameter of 2.25 inches or less that can operate at 12 volts, 24 volts or 120 volts. State-regulated SDDLs are further defined by additional characteristics such as base, lumen output and rated life. SDDLs may be incandescent, halogen or LED.

A state-regulated small diameter directional lamp is a directional lamp that meets all of the following criteria (see Title 20 Section 1602):

- Capable of operating at 12 volts, 24 volts, or 120 volts
- Has an ANSI ANSLG C81.61-2009 (R2014) compliant pin base or E26 base
- Is a non-tubular directional lamp with a diameter of less than or equal to 2.25 inches
- Has a lumen output of less than or equal to 850 lumens, or has a wattage of 75 watts or less
- Has a rated life greater than 300 hours

The requirements for SDDLs are shown in Table 1 below.

- The test method for state-regulated SDDLs that use incandescent filament technology is 10 C.F.R. Section 430.23(r) (Appendix R to Subpart B of part 430)
- The test method for LED California state-regulated small diameter directional lamps is the same as SLEDs (IES LM-79-08 with additional requirements in 80 Fed. Reg. 39665-39667 (July 9, 2015) section 430.23(ee)(Appendix BB to Subpart B of Part 430))
- For certification, compliance and enforcement purposes, the sampling provisions in 80 Fed. Reg 39664-39665 must be used for SDDLs that are LEDs
- The testing, performance and marking requirements for SDDLs can be found in Sections 1604(k), 1605.3(k)(3) and 1607, respectively

State-Regulated General Service Lamp (GSL)

California has had requirements in place for GSLs since 2011 (Title 20 Section 1605.3(k)(2) for Tier I requirements). On January 1, 2018 Tier II of the GSL requirements became effective. Lamps manufactured on or after January 1, 2018 are subject to the Tier II requirements.

The definition of a California state-regulated GSL is identical to the definition of a federally-regulated GSL found in Title 20, Section 1602(k), and includes general service incandescent, compact fluorescent, and LED lamps. It does not include fluorescent tubular lamps or incandescent reflector lamps. In addition to the requirements shown in Table 1 below, GSLs must also have a CRI greater than or equal to 80 for nonmodified spectrum lamps or 75 for modified spectrum lamps.

The test method for GSLs that use incandescent filament technology is 10 C.F.R. section 430.23(r) (Appendix R to Subpart B of part 430), and the test method for medium base CFLs is 10 C.F.R. section 430.23(y) (Appendix W to Subpart B of part 430). LED GSLs are *de facto* SLEDs and should be tested in accordance with the requirements in Title 20 Section 1604(k) and certified to the Energy Commission under the state-regulated LED lamp appliance type (and not as GSLs) if they meet the requirements for SLEDs described above.

The testing, performance and marking requirements for GSLs can be found in Title 20 Sections 1604(k), 1605.3(k)(2)(A & B) and 1607, respectively.



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	SLED Minimum Requirement		SDDL	GSL (Tier II)
Effective Date	Tier I January 1, 2018	Tier II July 1, 2019	January 1, 2018	January 1, 2018
Compliance Score ¹ Efficacy + [$\alpha \times \text{CRI}$]	282	297	Either: • 80 lumens per watt (lpw) or • 70 lpw and a minimum compliance score of 165	None
Minimum Efficacy	68 lpw	80 lpw		45 lpw
Minimum Rated life	10,000 hours		25,000 hours	1,000 hours
Standby Power	None	0.2 W	None	None

Table1: State-Regulated Requirements

¹ For SLEDs, $\alpha = 2.3$; for SDDLs, $\alpha = 1$.

How to Comply with Title 20

Compliance entails:

- Meeting the applicable design or performance standards (efficiency standards)
- Testing regulated products using the required test methods
- Marking the regulated product in accordance with Title 20 Section 1607, and
- Certifying the product to the California Energy Commission

Even if a regulated lighting product meets all performance, testing and marking requirements outlined in Title 20, it is illegal to sell or offer for sale a regulated product in California if the model is not certified to the Energy Commission and listed in the [MAEDbS](#).

Everyone in the sales chain – including manufacturers, distributors, retailers, contractors, importers and installers – is responsible for ensuring regulated products are listed in the [MAEDbS](#). To learn more about the MAEDbS and how to use it, view the [Energy Code Ace Title 20 On-Demand Video Trainings](#).

Frequently Asked Questions

- Q:** *Is a minimum of 10,000 testing hours needed to comply with the SLED requirement for a rated life of 10,000 rated hours or greater?*
- A:** No. The required test duration is determined by section 4.6 “Calculate Lumen Maintenance and Time to Failure” of the required LED test procedure found in 10 C.F.R. 430.23(ee) (Appendix BB to Subpart B of Part 430).
- Q:** *How do I know if an LED lamp that is used only for special applications is covered under Title 20?*
- A:** The requirements for SLEDs and SDDLs are independent of end-use or application, and are based only on lamp characteristics. A lamp is covered if it meets the definition of a SLED or SDDL per Title 20 Section 1602(k).
- Q:** *Do the definitions recently adopted by the U.S. Department of Energy and published in the Federal Register on January 19, 2017 apply to Title 20?*
- A:** No. All relevant definitions are included in Title 20, Section 1602(k), including those for federally-regulated general service incandescent lamps and federally-regulated incandescent reflector lamps. Federal definitions are not applicable to Title 20 until they are adopted by the California Energy Commission in a rulemaking.
- Q:** *If an LED lamp is certified for Title 24 “high efficacy” lamp requirements, does it need to be certified again for the Title 20 requirements?*
- A:** Yes. The lamp must be certified separately to the Title 20 requirements. Certification to the MAEDbS for California’s Building Energy Efficiency Standards (Energy Code or Title 24, Part 6) represents compliance with that program, not compliance with the requirements in Title 20, which is the Appliance Efficiency Program that regulates the sale of appliances in California. The Title 24 “high efficacy” requirements (also referred to as JA8) apply only to residential lamps and luminaires, and differ from the Title 20 requirements outlined here. A lamp that meets JA8 may not meet the efficacy (compliance score) required in Title 20. SLEDs that also meet JA8 are not lawful for sale in California after January 1, 2018 unless they are certified to the Energy Commission. While there is some testing overlap (both primarily reference IES LM-79), it is recommended that test laboratories review both requirements when testing LED lamps. The LED lamp must be listed in the MAEDbS to comply with Title 20.
- Q:** *Are retailers responsible for complying with Title 20? How about installation contractors?*
- A:** Yes and yes. Everyone in the supply chain – manufacturers, distributors, retailers, contractors and importers – is responsible for ensuring regulated products are listed in the MAEDbS before they are sold or offered for sale in California. Each party should independently determine applicable regulations for certain product types by referring to the Title 20 standards.
- Q:** *Are out-of-state retailers required to comply with Title 20 if they sell lighting products to someone in California via online or mail order sales?*
- A:** Yes. Products sold online or by mail from out-of-state retailers to an end-user in California must meet Title 20 requirements since they are being offered for sale and sold into California. The product models must be listed in the MAEDbS to be legally sold or offered for sale in California.
- Q:** *Are there marking requirements that manufacturers must comply with under Title 20?*
- A:** Title 20 specifies marking requirements for manufacturers in Section 1607(b), which states that the following must be “permanently, legibly, and conspicuously displayed on an accessible place on each unit” of the regulated appliance:
1. Manufacturer’s name or brand name or trademark
 2. Model number
 3. Date of manufacture, including year and month or smaller increment
- There is an exception for lamps where the information required by Section 1607(b) can be clearly and permanently placed on the product itself or on the product packaging (see Section 1607(c)(2)).
- There are also additional marking requirements for SLEDs found in Title 20 Section 1607(d)(13).
- Q:** *Do lamps packaged with ceiling fan light kits need to comply with any of the Title 20 lamp requirements?*
- A:** No. Ceiling fan light kits and the lamps they are packaged with are subject to federal energy and design standards (see 10 C.F.R. 430.2 and 430.32(s)). For example, if an LED lamp is packaged with a ceiling fan light kit, the lamp does not need to meet the Title 20 SLED requirements. However, ceiling fan light kits must still be certified to the Energy Commission and listed in the MAEDbS to be sold or offered for sale in California.
- Q:** *Are 3-way incandescent lamps packaged and sold with portable luminaires exempt from Title 20?*
- A:** No. Though 3-way incandescent lamps are not regulated by state or federal standards (when sold by themselves), they cannot be packaged and sold together with portable luminaires in California. Portable luminaires manufactured on or after January 1, 2010 must meet the applicable testing, performance, certification and marking requirements in Title 20. A 3-way portable luminaire is required to be packaged with a 3-way CFL or a 3-way LED. The light source must meet the minimum efficacy and performance requirements specified in section 1605.3(n).

For More Information

Primary Documents

- Title 20 Appliance Efficiency Regulations
tinyurl.com/Title20

California Energy Commission Information & Services

- Appliances Hotline: (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/appliances
- Modernized Appliance Efficiency Database (MAEDbS):
<https://cacertappliances.energy.ca.gov/Login.aspx>

Additional Resources

- California Lighting Technology Center (CLTC) Guide:
 - Lighting Appliance Efficiency Regulations: What's New in the Title 20 Code?
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:

- Fact Sheets
energycodeace.com/content/resources-fact-sheets/
 - Title 20 Certification Overview, Process and FAQs
 - Title 20 Lighting FAQs
 - High Efficacy Lighting for Manufacturers
 - Residential High Efficacy Lighting – JA10 Flicker – Fourier Transform
 - Residential High Efficacy Lighting - Title 20 and Title 24, Part 6 JA8: Key Differences and Overlap
- 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! You can also email us at Title20@energycodeace.com.

Energy Code Ace is here to help you ensure your products meet the requirements of California’s appliance and equipment efficiency energy code, Title 20 – which can help ensure that you don’t encounter issues that impact your sales and bottom line, including avoiding facing civil penalties under Title 20 Section 1609 for noncompliant products.



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