

90+

LIGHTING

CALIFORNIA LIGHTING CODES

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CEO 90+ Lighting

A **SAVEENERGY** company

NA Division of the largest LED OEM in Brazil.

Focused on CEC listed products, Title 20 and JA8/Title 24

All 90+ CRI, R9>50, flicker<30%

Background

30+ years in lighting

Last 8 years in VP roles at Soraa

Joined 90+ Lighting in April 2018

Program Overview

Review 2016-2020 California Energy Commission (CEC) requirements as they relate to LED Lamps and Fixtures.

Learning Objectives

1. California Energy Commission overview - Understand the CEC goals, rulemaking, standard schedule and implementation dates
2. Review and understand Title 20 requirements for LED lamps, 2018 standards and future changes
3. Review and understand JA8/Title 24 requirements for LED lamps and fixtures, 2016 standards and future changes
4. Review dates for implementation, who is affected, potential costs and penalties for non-compliance and how these standards may affect other states

California Lighting codes: figuring out the path

Title 20 – Lamps and retrofit downlights

Mandatory for all products effective January 2018

Applies to most lamp applications in CA

Was voluntary prior to this year, now required

Update effective July 1, 2019

Title 24 / JA8-2016 - Applies to both lamps and fixtures

Adopted January 1, 2016. Became mandatory for permitted residential applications in January 2017, housing, hotels, motels, dorms, firehouses, and other multi-family.

New update for 2019 becomes effective January 1, 2020

Title 20

GSL, SLED and SDDL lamps



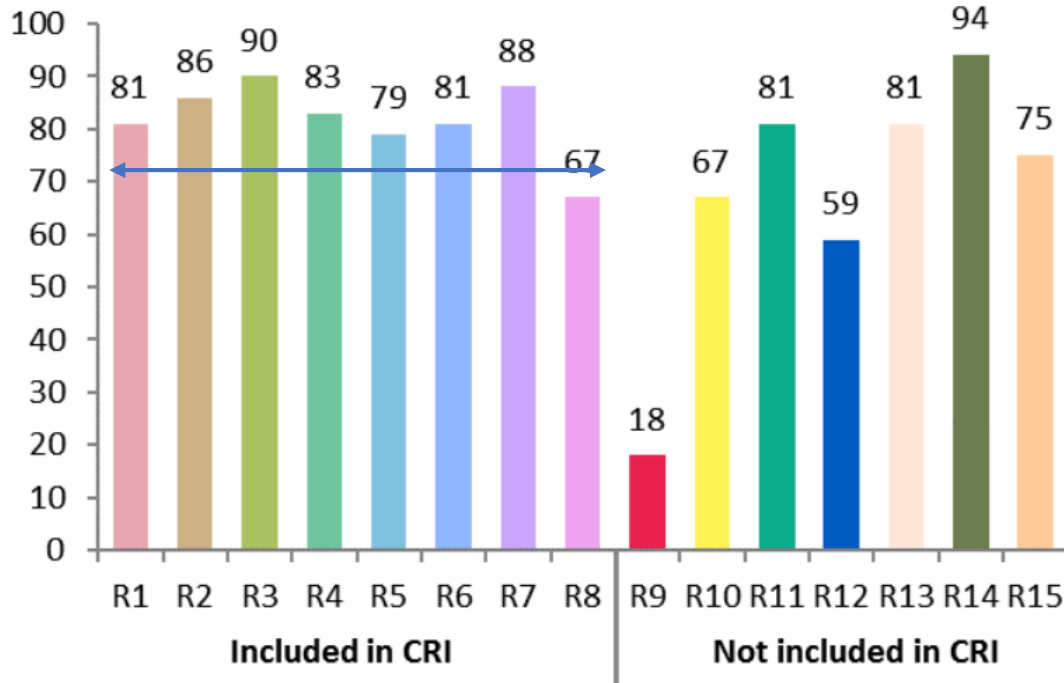
	SLED Minimum Requirement		SDDL	GSL (Tier II)
Effective Date	Tier I January 1, 2018	Tier II July 1, 2019	January 1, 2018	January 1, 2018
Compliance Score ¹ Efficacy + [$\alpha \times$ CRI])	282	297	Either: <ul style="list-style-type: none"> • 80 lumens per watt (lpw) or • 70 lpw and a minimum compliance 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

Table 1: State-Regulated Requirements

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

CTLC: Effective January 2018, all products must be listed in the CEC databases.

Title 20 Other Requirements



Additional Requirements

- R1 - R8 values ≥ 72
- CRI ≥ 82
- PF ≥ 0.7
- SLED Rated Life $\geq 10,000$ hrs, SDDL $\geq 25,000$ hrs
- If dimmable, to 10%



Efficacy score pushes 90+ CRI products

Effective Date	Minimum Compliance Score	Minimum Efficacy Lm/W
January 1, 2018	282	68
July 1, 2019	297	80



The compliance score is the sum of the efficacy and 2.3 times the CRI.

Example 1

CRI	Minimum Efficacy Lm/W	Score
80	75	FAIL
x 2.3		
184	75	259

Example 2

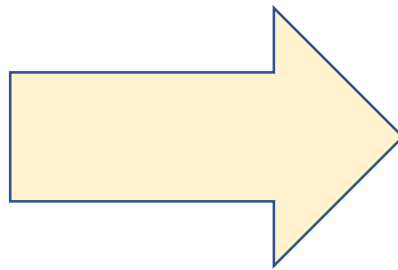
CRI	Minimum Efficacy Lm/W	Score
90	75	PASS
x 2.3		
207	75	282

New (July 1 2019) SLED Compliance scores means 90+ CRI

Compliance Scores - All other lamps

Jan-18	TIER 1	C Score
LPW	CRI	
68	93	282
69	93	282
70	92	282
71	92	282
72	91	282
73	91	282
74	90	282
75	90	282
76	90	282
77	89	282
78	89	282
79	88	282
80	88	282
81	87	282
82	87	282
83	87	282
84	86	282
85	86	282
86	85	282
87	85	282
88	84	282
89	84	282
90	83	282
91	83	282
92	83	282
93	82	282
94	82	282

Min LPW goes
from 68 to 80
July 1, 2019



Compliance Scores - All other lamps

Jul-19	TIER 2	C Score
LPW	CRI	
80	94	297
81	94	297
82	93	297
83	93	297
84	93	297
85	92	297
86	92	297
87	91	297
88	91	297
89	90	297
90	90	297
91	90	297
92	89	297
93	89	297
94	88	297
95	88	297
96	87	297
97	87	297
98	87	297
99	86	297
100	86	297
101	85	297
102	85	297
103	84	297
104	84	297
105	83	297
106	83	297
107	83	297
108	82	297

Effectively
requires
90+ CRI in
order to
meet 297
Compliance
Score

New (July 1 2019) SDDL Compliance scores also means 90+ CRI

January 2018 Compliance Score - lamps<2.25"		
CRI + LPW = 165		
lumens/W	CRI	C Score
65	100	165
66	99	165
67	98	165
68	97	165
69	96	165
70	95	165
71	94	165
72	93	165
73	92	165
74	91	165
75	90	165
76	89	165
77	88	165
78	87	165
79	86	165
80	85	165
81	84	165
82	83	165
83	82	165
84	81	165
85	80	165

Title 24 Requirements

JA8/T24 applies a higher quality standard than T20

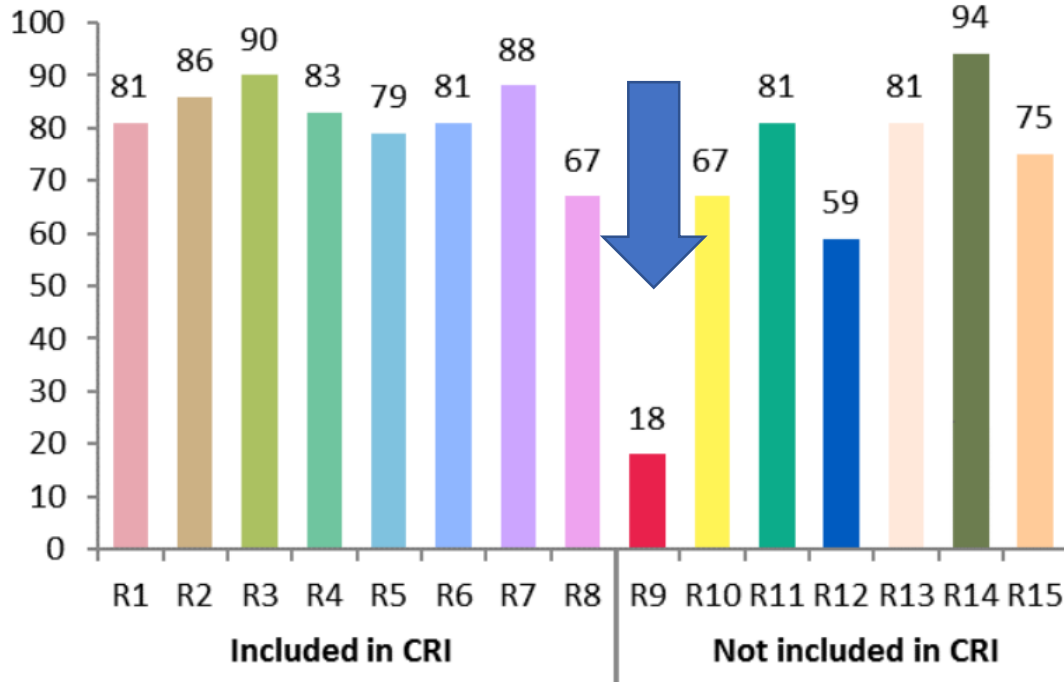
- 90+ CRI
- R9>50
- Flicker<30%
- Power factor = 0.9

Just because a lamp meets JA8/Title 24, it does not necessarily meet the required Title 20 listing

- **Lamps must first meet T20** to be sold in CA
- JA8/T24 is a subset of T20, and is a more stringent quality specification
- JA8/T24 applies only to permitted residential

Lamps not only need to be registered in CEC JA8 database, but also under State-Regulated LED lamps in 2018.

Title 24 Color Quality



Additional Requirements

- CRI ≥ 90
- PF ≥ 0.9
- SLED Rated Life ≥ 10,000 hrs, SDDL ≥ 25,000 hrs
- Dimmable



T20 VS JA8/T24 LISTED, CURRENT STANDARDS

- Applications
- Efficacy
- C score SLED (CRI*2.3+LPW)
- C score SDDL (CRI+LPW)
- CRI
- Lifetime
- Flicker
- R9
- Dimmable
- Power Factor
- Marking
- Effective date



Title 20

- All Buildings
- 68 LPW(2018) 80 LPW(2019)
- 282 Jan 2018, 297 July 2019
- 80 or 70 LPW + C score = 165
- 82 CRI min
- 10,000 hrs, 25,000 hrs SDDL
- Reduced flicker if dimmable
- None, but R1-R8 >72
- No, but 10% if dimmable
- 0.70 PF
- Date, OEM, SKU
- Jan 1 2018, July 1 2019



JA8/Title 24

- Residential Permitted
- 45 LPW
- None, but T20 in 2019
- None but T20 in 2019
- 90 CRI (2016), 82CRI (2019)
- >15,000 hrs
- <30% flicker
- >50, none in 2020
- Yes, to 10%
- 0.90 PF
- JA8-2016/19 or E
- Jan 1 2017, Jan 1 2020

In 2019, the JA8/T24 lamp standards (enforced 01/2020) will be reconciled to the T20 version. The current JA8/T24 are enforced through 2019.

- Applications
- Efficacy
- C score SLED (CRI*2.3+LPW)
- C score SDDL (CRI+LPW)
- CRI
- Lifetime
- Flicker
- R9
- Dimmable
- Power Factor
- Marking
- Effective date



Through 2019

- Residential Permitted Applications
- 45 LPW
- 90 CRI
- Lifetime >15,000 hrs
- <30% flicker
- R9>50
- Yes, to 10%
- 0.90 PF
- JA8-2016/19 or E



Effective 01/2020

- Residential Permitted Applications
- 80 LPW and C score 297 for SLED
- 70 LPW and C score 165 or 80 LPW for SDDL
- 82 CRI min
- 10,000 hrs, 25,000 hrs SDDL
- Reduced flicker if dimmable
- None, but R1-R8 >72
- No, but 10% if dimmable
- 0.70 PF

Who is responsible?

Responsibilities

Manufacturers and retailers both have responsibilities under Title 20.

Manufacturers are responsible for certifying that their products comply with the standards.

Retailers are responsible for ensuring that products offered for sale in California appear in the Appliance Efficiency Database.

Consequences

Any person including a retailer, manufacturer, contractor, importer or distributor that sells or offers for sell a regulated appliance that is not listed by the CEC may be subject to civil penalties for each unit sold or offered for sale.

Civil penalties up to \$2,500 for each violation (per unit sold) can be assessed.

<https://cacertappliances.energy.ca.gov/Pages/ApplianceSearch.aspx>