



Susan Larson, 90 Plus Lighting

90+

LIGHTING

CALIFORNIA LIGHTING CODES

California Lighting codes: What's the difference?

Title 20 – Appliance Standard for Lamps and retrofit downlights

Mandatory for all products effective January 2018

Applies to most socketed lamps sold in CA

Was voluntary prior to 2018, now required

Update effective July 1, 2019

Title 24 / JA8-2016 – Application Building Standard for both lamps and fixtures

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

New update for 2019 becomes effective January 1, 2020

Title 20 Appliance Standard Affects GSL, SLED and SDDL lamps



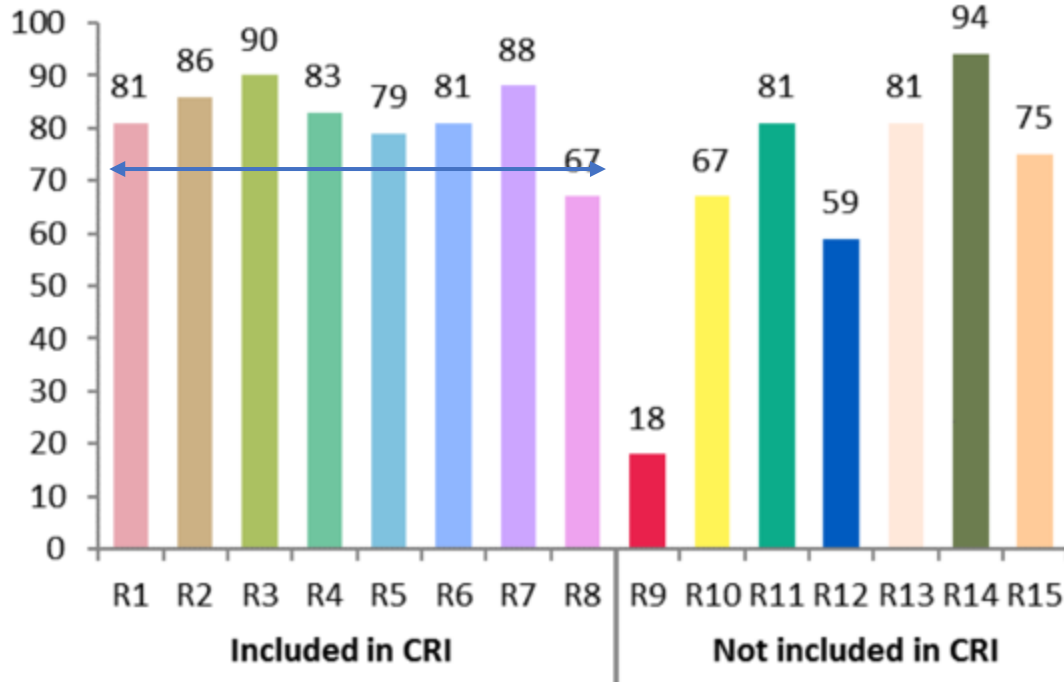
	SLED Minimum Requirement		SDDL	GSL (Tier II)
	Tier I January 1, 2018	Tier II July 1, 2019	January 1, 2018	January 1, 2018
Effective Date	Tier I January 1, 2018	Tier II July 1, 2019	January 1, 2018	January 1, 2018
Compliance Score ¹ Efficacy + ($\alpha \times \text{CRI}$)	282	297	Either: <ul style="list-style-type: 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

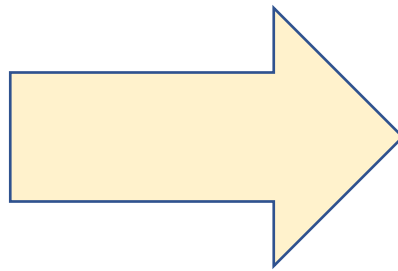
CRI	Minimum Efficacy Lm/W	Score
90	75	PASS
x 2.3		
207	75	282

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

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

JA8-2016 applies a higher quality standard than T20

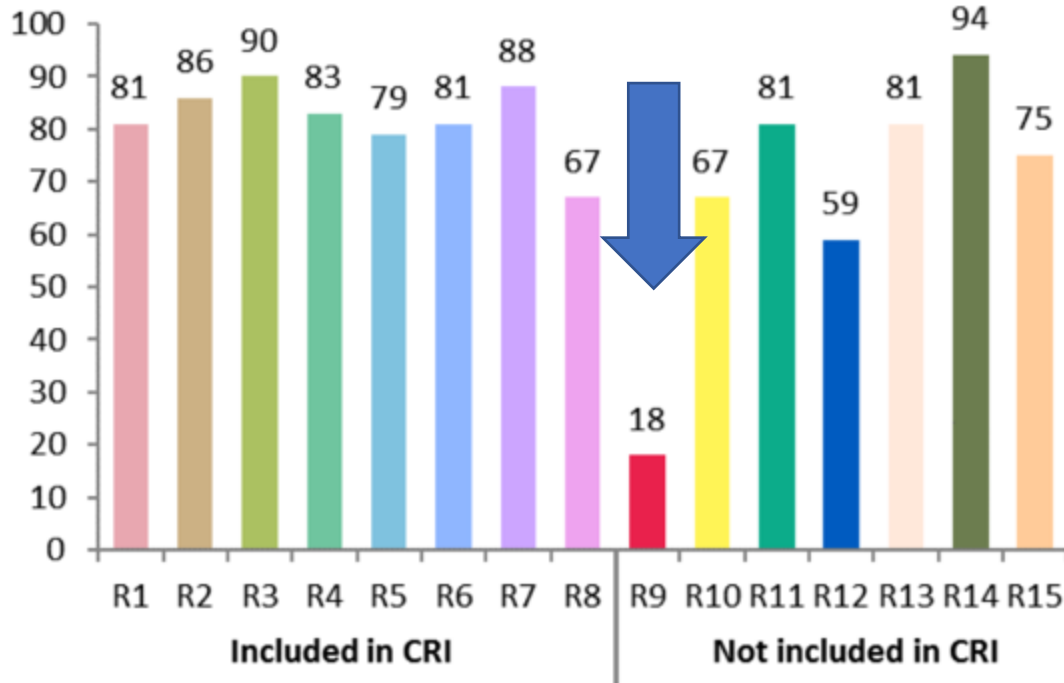
- CRI \geq 90
- R9 \geq 50
- Flicker < 30%
- Power factor \geq 0.9

Just because a lamp meets JA8-2016 in Title 24, it does not necessarily meet the required Title 20 listing, or that it is LEGAL to be sold in CA.

- **Lamps must first meet T20** to be legally sold in CA
- JA8-2016 applies after first meeting Title 20
- JA8-2016 applies only to permitted residential and other dwelling applications such as hotel/motel rooms, firehouses and dormitories.

Lamps need to be registered in CEC JA8 database, but also under State-Regulated LED lamps and State-Regulated Small Diameter Directional lamps in 2018. This can be found here, <https://cacertappliances.energy.ca.gov/Pages/ApplianceSearch.aspx>.

Title 24 Color Quality



Additional Requirements

- CRI ≥ 90
- PF ≥ 0.9
- Rated Life ≥ 15,000 hrs.
- Dimmable



T20 vs JA8-2016/T24 listed, current LED standards

- Application/Product
- 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

- LED socketed lamps
- LPW ≥ 68 and 282 C score for SLEDs
- LPW ≥ 80 or $70 + \text{CRI} = 165$ for SDDLs
- CRI ≥ 82
- $\geq 10,000$ hrs SLED, $\geq 25,000$ 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



JA8/Title 24

- Residential/Other Permitted Buildings and Dwellings
- LPW ≥ 45
- None
- None
- CRI ≥ 90
- $\geq 15,000$ hrs
- Flicker $< 30\%$
- R9 ≥ 50
- Dimming required to 10%
- 0.90 PF
- JA8-2016 or JA8-2016-E (enclosed use)
- Jan 1 2017

In 2019, the JA8-2019 lamp standards under Title 24 (enforced 01/2020) will use the T20 C-Scores, but no specific CRI or R9 values. The JA8-2016 requirements apply through 2019. However, the 2019 C-scores effectively still mean high CRI.

- *Application/Product*
- *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/Other Dwellings*
- *LED socketed lamps*
- *LPW ≥ 45*
- *CRI ≥ 90*
- *Lifetime $\geq 15,000$ hrs*
- *<30% flicker for frequencies <200 Hz*
- *R9 ≥ 50*
- *Yes, dimmable to 10%*
- *≥ 0.90 PF*
- *JA8-2016 or JA8-2016-E*
- *January 1, 2017*



Effective 01/2020

- *Residential/Other Dwellings*
- *LED socketed lamps*
- *≥ 80 LPW and C score 297 for SLED*
- *≥ 70 LPW and CRI = 165 or ≥ 80 LPW for SDDL*
- *Lifetime $\geq 15,000$ hrs*
- *<30% flicker for frequencies <200 Hz*
- *Yes, dimmable to 10%*
- *≥ 0.90 PF*
- *JA8-2016 or JA8-2016-E*
- *January 1, 2020*

JA8-2016/Title 24: Who is responsible?

Contractors, Designers and Distributors/OEMS are responsible

Designers ensure that:

- Homes and other applicable dwelling spaces are designed to meet JA8 and that the building has been designed to comply with the Building Energy Efficiency Standards.

Contractors ensure that:

- JA8-compliant products are installed at time of inspection and that new homeowners are provided with a luminaire schedule that includes list of installed lamps and luminaries.

Distributors and OEMs are responsible for educating customers and selling listed products.

Enforcement is by local inspectors

The local authority having jurisdiction, often the building department, will likely require an inspection before finalizing the permit. Building inspections are often scheduled by the contractor on behalf of the building owner. Once all systems are installed and inspected, and completed compliance documentation has been verified, a Certificate of Occupancy will be issued by the local jurisdiction.

Title 20: Who is responsible?

Enforcement

Title 20 enforcement is by the California Energy Commission (CEC).

- “It is illegal to sell or offer for sale in the state any regulated product that is not certified to the CEC and listed in the MAEDBS.”
- “OEMs, distributors, contractors and online retailers shipping into California are liable and required to comply with Title 20.”

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.”

How do I check for compliance? Check for “State-regulated” listed products in the online CEC database.

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

Legal: Title 20 (State-regulated) plus JA8

Model Number | Appliance Type | Company | **Brand** | Appliance Status

Select Brand
90+ Lighting

Search Clear

Search Results 188 record(s) found Export To: Excel CSV

	Model	Appliance Type	ManufacturingCompany	Brand	Regulatory Status	Add Date
Select	SE-350.068	2016 JA8 High Efficacy Lighting	SAVE ENERGY LED AUTHORITY CORPORATION	90+ Lighting	Non Federally-Regulated	10/11/2018
Select	SE-350.068	State-regulated Light Emitting Diode Lamp	SAVE ENERGY LED AUTHORITY CORPORATION	90+ Lighting	Voluntarily Certified	10/11/2018
Select	SE-350.069	State-regulated Light Emitting Diode Lamp	SAVE ENERGY LED AUTHORITY CORPORATION	90+ Lighting	Voluntarily Certified	10/11/2018
Select	SE-350.069	2016 JA8 High Efficacy Lighting	SAVE ENERGY LED AUTHORITY CORPORATION	90+ Lighting	Non Federally-Regulated	10/11/2018
Select	SE-350.070	2016 JA8 High Efficacy Lighting	SAVE ENERGY LED AUTHORITY CORPORATION	90+ Lighting	Non Federally-Regulated	10/11/2018
Select	SE-350.070	State-regulated Light Emitting Diode Lamp	SAVE ENERGY LED AUTHORITY CORPORATION	90+ Lighting	Voluntarily Certified	10/11/2018
Select	SE-350.073	2016 JA8 High Efficacy Lighting	SAVE ENERGY LED AUTHORITY CORPORATION	90+ Lighting	Non Federally-Regulated	10/19/2018
Select	SE-350.073	State-regulated Small Diameter Directional Lamps	SAVE ENERGY LED AUTHORITY CORPORATION	90+ Lighting	Non Federally-Regulated	10/31/2018

Not legal: No Title 20, only JA8-2016 listed

Model Number | Appliance Type | **Company** | Brand | Appliance Status

Select Manufacturer
Soraa, Inc.

Search Clear

Search Results 111 record(s) found Export To: Excel CSV

	Model	Appliance Type	ManufacturingCompany	Brand	Regulatory Status	Add Date
Select	SGB11-08-270D-927-04	2016 JA8 High Efficacy Lighting	Soraa, Inc.	Soraa Vivid	Non Federally-Regulated	08/15/2017
Select	SM16-07-10D-927-03	2016 JA8 High Efficacy Lighting	Soraa, Inc.	Soraa Vivid	Non Federally-Regulated	11/21/2016
Select	SM16-07-10D-930-03	2016 JA8 High Efficacy Lighting	Soraa, Inc.	Soraa Vivid	Non Federally-Regulated	11/21/2016
Select	SM16-07-25D-927-03	2016 JA8 High Efficacy Lighting	Soraa, Inc.	Soraa Vivid	Non Federally-Regulated	11/30/2016
Select	SM16-07-25D-930-03	2016 JA8 High Efficacy Lighting	Soraa, Inc.	Soraa Vivid	Non Federally-Regulated	11/30/2016
Select	SM16-07-36D-927-03	2016 JA8 High Efficacy Lighting	Soraa, Inc.	Soraa Vivid	Non Federally-Regulated	11/30/2016
Select	SM16-07-36D-930-03	2016 JA8 High Efficacy Lighting	Soraa, Inc.	Soraa Vivid	Non Federally-Regulated	11/30/2016
Select	SM16-09-25D-927-03	2016 JA8 High Efficacy Lighting	Soraa, Inc.	Soraa Vivid	Non Federally-Regulated	11/29/2016

As of 6/7/2019

Susan Larson

90+ LIGHTING

A **SAVE ENERGY** company

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NA Division of the largest LED lamp 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

CEO 90+ Lighting, April 2018

Last 8 years in VP roles at Soraa