Voluntary California Quality LED Lamp Specification 3.0

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Efficiency Division
Appliances and Outreach & Education Office

February 8, 2017
Voluntary California Quality LED Lamp Specification 3.0

Our webinar will begin at the top of the hour.

This slide deck will be posted on our webpage after the presentation at www.energy.ca.gov/appliances/forms/index.html#webdocs.
Resources

Title 20 Compliance Assistance Hotline
Toll free inside California  (888) 838-1467
From outside of California  (916) 651-7100
appliances@energy.ca.gov

Title 20 Compliance Assistance listserv
http://www.energy.ca.gov/efficiency/listservers.html

Webinar documents
http://www.energy.ca.gov/appliances/forms/index.html#webdocs
Presentation Topics

I. Background & Context

II. Specification Scope

III. Specification Elements
   I. Testing
   II. Performance
   III. Controls
   IV. Marking and packaging

IV. Certification
Background

Voluntary California Quality LED Lamp Specification represents the Energy Commission’s recommendation for minimum requirements for an LED light to be considered “California quality”

- LED lamps can achieve similar performance to incandescent lamps with less power
- Mandatory Title 20 standards for state-regulated LED lamps take effect January 1, 2018
- Title 20 standards include both efficacy and minimum performance requirements
Background (cont.)

Version 3.0 aligns with the Title 20 standards for state-regulated LED lamps.

Version 3.0 of the Specification encourages early adoption of LED lamps. Certification to the Commission is not required but it is encouraged because the database is used by utility rebate programs.
Timeframe of the Specification

Tier 1: January 1, 2017 – December 31, 2017
Tier 2: January 1, 2018 – June 30, 2019
Scope

Applies to LED lamps that meet four criteria:

(1) Lamp base

(2) Brightness

(3) Correlated color temperature (CCT)

(4) Chromaticity
Scope

(1) Lamp base criterion

The lamp bases covered under the specification must have an American National Standards Institute (ANSI) standard E12, E17, E26, or GU24 base.
(2) Brightness criterion

The lamp must be capable of producing a quantity of light suitable for general illumination, meaning brightness less than or equal to 2,600 lumens, and:

- For candelabra bases, brightness greater than or equal to 150 lumens

- For other bases, brightness greater than or equal to 200 lumens
(3) Correlated color temperature

The lamp must be capable of producing white light criterion with a correlated color temperature between 2,200 K and 7,000 K.
(4) Chromaticity criteria

The lamp must have a Duv ±0.012, indicative of white light.
Scope

Examples of lamps in the scope
Scope

Examples of lamps not in the scope
Elements of the Voluntary California Quality LED Lamp Specification
## Effective Dates

<table>
<thead>
<tr>
<th>Effective Date</th>
<th>Minimum Efficacy Lumens Per Watt</th>
<th>Minimum Compliance Score: Efficacy +2.3 x CRI</th>
<th>Maximum Standby Power (Watts)</th>
<th>Voluntary Spec Version 3.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before 1/1/2018</td>
<td>68</td>
<td>282</td>
<td>_</td>
<td>Tier 1</td>
</tr>
<tr>
<td>On and after 1/1/2018</td>
<td>80</td>
<td>297</td>
<td>0.2</td>
<td>Tier 2</td>
</tr>
</tbody>
</table>
Test Procedures

10 C.F.R 430.23(ee) and Appendix BB to Subpart B of Part 430

- Input power
- Lumen output
- Lumens per watt
- Correlated color temperature
- Duv
- Color rendering index (including R1 – R8)
- Power factor
- Lumen maintenance
- Time to failure
- Lamp standby power
# Test Procedures

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Test Procedure</th>
<th>Required or Optional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flicker</td>
<td>Title 24, part 6, Joint Appendix 10 (2016), tested at both 100% and 20% output. Lamps with a percent amplitude modulation (percent flicker) less than 30 percent at frequencies less than 200Hz shall report “yes” for “reduced flicker operation” described in section 1606, otherwise report “no.”</td>
<td>Optional</td>
</tr>
<tr>
<td>Lumen Maintenance, Rated Life, and Survival Rate for Compliance with Title 24 Joint Appendix 8 and minimum dimming level</td>
<td>Title 24, part 6, Joint Appendix 8 (2016).</td>
<td>Optional</td>
</tr>
<tr>
<td>Audible Noise</td>
<td>ENERGY STAR® Recommended Practice – Noise (2013) with the following modification: measurements shall be taken at 100 percent output as well as at 20 percent output if dimmable.</td>
<td>Optional</td>
</tr>
</tbody>
</table>
Test Procedures

Manufacturers **may report estimated values** for the minimum rated life based on the tests for lumen maintenance and time to failure **for purposes of Tier 1** of this specification until testing is complete.

Manufacturers must complete the rated life testing and update MAEDBS with those values using the new federal test procedure once testing is completed, and no later than the effective date of the Title 20 appliance efficiency regulations for state-regulated LED lamps.
Photometric Performance Requirements.

Minimum luminous efficacy

Before January 1, 2018 = 68 lumens per watt (Tier 1)

On/after January 1, 2018 = 80 lumens per watt (Tier 2)
Photometric Performance Requirements

Minimum combined efficacy score

<table>
<thead>
<tr>
<th></th>
<th>Minimum Compliance Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tier 1</td>
<td>282</td>
</tr>
<tr>
<td>Tier 2</td>
<td>297</td>
</tr>
</tbody>
</table>
Photometric Performance Requirements

Color rendering

Minimum average CRI (Ra) is 82

Minimum individual color score for R1 through R8 is 72
Photometric Performance Requirements

Minimum light distribution

• ANSI standard lamp shape of B, BA, C, CA, F, or G: decorative light distribution requirements of ENERGY STAR's Product Specification for Lamps Version 1.1 (August 2014) apply

• A-shape lamps: omnidirectional light distribution requirements of ENERGY STAR’s Product Specification for Lamps Version 2.0 (December 2015) apply
# Photometric Performance Requirements

<table>
<thead>
<tr>
<th>ANSI</th>
<th>BULB SHAPES</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Arbitrary (standard)</td>
<td>Universal use for home lighting</td>
</tr>
<tr>
<td>B</td>
<td>Bullet or Blunt Tip</td>
<td>Decorative</td>
</tr>
<tr>
<td>BA</td>
<td>Bulged with angular tip</td>
<td>Decorative</td>
</tr>
<tr>
<td>C</td>
<td>Cone shape</td>
<td>Used mostly for small appliances and indicator lamps</td>
</tr>
<tr>
<td>CA</td>
<td>Candle</td>
<td>Chandeliers and Decorative</td>
</tr>
<tr>
<td>F</td>
<td>Flame</td>
<td>Decorative interior lighting</td>
</tr>
<tr>
<td>G</td>
<td>Globe</td>
<td>Ornamental lighting and some floodlights</td>
</tr>
</tbody>
</table>
Photometric Performance Requirements

Correlated color temperature (CCT)

The chromaticity and color consistency requirements are in Table 1 of Annex B of ANSI C78.377-2015, approximately equivalent to a 4-step MacAdam ellipse.
Rated Lifetime Requirements

Minimum rated life is 10,000 hours
Electrical Performance Requirements

- Minimum power factor is 0.7
- Maximum standby power for connected lamps is 0.2 watts on and after January 1, 2018
Controls Requirements

Lamps are not required to be dimmable, however lamps that claim to be dimmable shall:

- Dim down to 10 percent output.
- Have reduced flicker operation.*
- Not produce noise in excess of 24 A-weighted decibels at 100 percent and 20 percent outputs.

*The lamp has less than 30 percent amplitude modulation at frequencies less than 200Hz at 100% and 20% light output for dimmable lamps.
Labeling and Packaging Requirements

**Dimmable**

- If labeled dimmable, the product must meet the control requirements for dimmable lamps

- If the product does not use a standard phase-cut dimmer, but uses another type of dimmer, dimmability can be qualified with the phrase “dimmable with LED dimmer”; instructions describing the type of dimmers that are compatible or recommended for use with the lamp shall be included
Labeling and Packaging Requirements

Comparison to incandescent performance

If the manufacturer makes any claims of being equivalent in performance to an incandescent, the lamp shall:

- Have a CCT of 3000K or less.
- Have a lumen output of 310 lumens or greater for E26-base.
- Have a lumen output of 150 lumens or greater for E12 and E17 bases.
- Meet the controls requirements for dimmable lamps.
Labeling and Packaging Requirements

Equivalent incandescent wattage

If the manufacturer makes wattage equivalency claims for medium screw-base and GU-24 base omnidirectional lamps, the lamps shall have a minimum lumen output as follows.

<table>
<thead>
<tr>
<th>Claimed Equivalent Wattage</th>
<th>Minimum Lumen Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 W</td>
<td>310</td>
</tr>
<tr>
<td>60 W</td>
<td>750</td>
</tr>
<tr>
<td>75 W</td>
<td>1050</td>
</tr>
<tr>
<td>100 W</td>
<td>1490</td>
</tr>
<tr>
<td>150 W</td>
<td>2500</td>
</tr>
</tbody>
</table>
How to Certify to MAEDBS
Provisional certification

- **Rated Lifetime Test Completed (T/F)** ([RatedLifetimeTestCompleted]):
  
  **E:** Enter the appropriate code representing whether or not the rated lifetime test has been completed. Other entries not shown in the table below will result as an unsuccessful entry.

  **M:** Select the appropriate option from the dropdown menu using the options in the table below.

<table>
<thead>
<tr>
<th>Code</th>
<th>Action</th>
<th>Rated Lifetime Test Completed</th>
</tr>
</thead>
</table>
| T    | True   | The required test procedure, 10 C.F.R. section 430.23(ee) and Appendix BB to Subpart B of Part 430, has been completed.  
  **Note:** This selection requires the completed test value of the rated lifetime to be reported in the next field. |
| F    | False  | The required test procedure, 10 C.F.R. section 430.23(ee) and Appendix BB to Subpart B of Part 430, is in progress, with an estimated value provided during disclosure.  
  **Note:** This selection requires an estimated value of the rated lifetime and must be updated upon completion of the required test procedure prior to the effective date of the mandatory CA Title 20 Tier 1 standard (1/1/2018). Otherwise, the model being certified will be archived regardless of what tier it meets. |
Provisional certification

- **Regulatory Status [RegulatoryStatus]:**

  **E:** Enter the appropriate code representing the regulatory status. Other entries not shown in the table below will result as an unsuccessful entry.

  **M:** Select the appropriate regulatory status from the dropdown menu from the options in the table below.

<table>
<thead>
<tr>
<th>Code</th>
<th>Regulatory Status</th>
<th>Note: This code, for this appliance type only, is synonymous with meeting the Voluntary California Quality LED Lamp Specification, Version 3.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>V</td>
<td>Voluntarily Certified</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>Non-Federally Regulated</td>
<td>This code is not a valid choice until the first mandatory CA Title 20 tier takes effect on 1/1/2018. Prior to 1/1/2018, only the code ”V” can be selected.</td>
</tr>
</tbody>
</table>

Save the excel file as .xlsx format in a location where you will be able to find it when it is time to upload the data file.
Provisional certification

- **Tier [Tier]:**
  
  *This field is not part of the Excel certification template and should be left blank if the Manual Entry method is being used.*

  The Tier field will be calculated by MAEDBS to indicate which tier was met using preceding data values such as Efficacy, Compliance Score, and Standby Power. Using a combination of this calculated result and the letters “V” or “N” in the following Regulatory Status field, a model can be determined to comply with a certain tier of either the CA Voluntary Specification or a mandatory CA Title 20 standard.
California Utility Residential Lighting Incentive Program Overview

Qualifying products must meet:

California Voluntary Quality LED Lamp Specification.

Qualifying products must be listed on MAEDBS
California Investor Owned Utility Residential Lighting Incentive Program Transition Details

• Participants have until March 15, 2017, to comply with Version 3.0 (released January 2017).
  – Utilities will allow sales or shipments of products that were eligible at the end of 2016 with Version 2.0 until March 15, 2017

• After March 15, 2017, all LED products must comply with Version 3.0
California Utility Residential Lighting Incentive Program Leads

Detailed participation instructions are available at:

<table>
<thead>
<tr>
<th>Utility</th>
<th>Contact Name</th>
<th>Email</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pacific Gas and Electric Company (PG&amp;E)</td>
<td>Gayle Revels</td>
<td><a href="mailto:Gayle.Revels@pge.com">Gayle.Revels@pge.com</a></td>
<td>415-973-4086</td>
</tr>
<tr>
<td>Southern California Edison (SCE)</td>
<td>Richard Greenburg</td>
<td><a href="mailto:Richard.Greenburg@sce.com">Richard.Greenburg@sce.com</a></td>
<td>626-302-0728</td>
</tr>
<tr>
<td>San Diego Gas &amp; Electric (SDG&amp;E)</td>
<td>Jeff Cox</td>
<td><a href="mailto:JCox2@semprautilities.com">JCox2@semprautilities.com</a></td>
<td>585-650-6125</td>
</tr>
</tbody>
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Resources

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Questions & Answers
## Timeline for LED lamp programs

<table>
<thead>
<tr>
<th>Tier 1</th>
<th>Tier 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Voluntary CA Quality</strong></td>
<td><strong>B. Title 20 Standard</strong></td>
</tr>
<tr>
<td>LED Lamp Specification</td>
<td>for State-regulated LED</td>
</tr>
<tr>
<td>Version 3.0</td>
<td>Lamps</td>
</tr>
<tr>
<td>January 1, 2017</td>
<td>January 1, 2018</td>
</tr>
<tr>
<td></td>
<td>July 1, 2019</td>
</tr>
</tbody>
</table>