

Appendix D

TABLE OF PRE-QUALIFIED INTEGRAL LED LAMPS, FIXTURES & QUALIFICATION PROCESS



Port of Stockton
January 1, 2014

Appendix D: Pre-Qualified Integral LED Lamps & Qualification Process

D1: PRE-QUALIFIED INTEGRAL LED LAMPS AND FIXTURES

D2: INTEGRAL LED LAMPS QUALIFICATION PROCESS

D3: APPENDIX OF RESOURCES

D1: PRE-QUALIFIED INTEGRAL LED LAMPS

Following are typical LED lighting product types;



1. The Port of Stockton uses the ENERGY STAR® eligibility criteria for integral LED lamps are defined as follows: a lamp with LEDs, an integrated LED driver, and an ANSI standardized base designed to connect to the branch circuit via an ANSI standardized lamp holder/socket.

See Appendix D Table 1 for the December 4, 2012 list. The current ENERGY STAR® approved LED lamp products is available at;

http://www.energystar.gov/index.cfm?fuseaction=iledl.display_products_pdf

The ENERGY STAR® December 4, 2012 Qualified LED Lighting Fixture list is available in Appendix D Table 2 and a current update is available at:

http://www.energystar.gov/ia/products/prod_lists/Fixtures_Product_List.xls?be09-a3bd

These lists are updated frequently and we suggest that applicants get the most recent copy.

LED lamps intended to replace linear fluorescent or high-intensity discharge (HID) lamps are not eligible for incentives at this time.

2. All lamps must be ENERGY STAR®-qualified. For non approved lamps see Section D3 of this appendix for pre-qualification process instructions.
Please note, pre-qualification for lamps must be completed prior to application submittal.

3. Program and technical requirements are subject to change.

E2: INTEGRAL LED LAMPS QUALIFICATION PROCESS

Please note, ENERGY STAR® qualification for lamps must be completed prior to application submittal. Please utilize the ENERGY STAR® LED Light Bulb application for qualification procedures found at:

http://www.energystar.gov/ia/partners/product_specs/program_reqs/SSL_Key_Product_Criteria.pdf?1b87-4767

Once the LED integral lamp achieves the ENERGY STAR® qualification and is listed in their Qualified LED Lighting list.

Commercial Lamp Criteria

Criteria Item (Commercial)	Under-cabinet shelf-mounted task lighting	Portable desk task lights	Recessed/surface/pendant-mounted downlights	Wall wash luminaires	Bollards
Light Output	Measured fixture length (in)/12 x 125	200 lumens	d 4.5 aperture ³ : 345 lumens > 4.5 aperture: 575 lumens	575 lumens	-
Efficacy	29 lm/W	29 lm/W	35 lm/W	40 lm/W	35 lm/W
Zonal Lumen Density	60% total lumens within 0-60° zone, 25% within 60-90° zone	85% total lumens within 0-60° zone	75% total lumens within 0-60° zone	50% of total lumens within 20-4° zone	<15% total lumens within 90-110° zone. Cannot emit light over 110. °
Allowable CCTs	2700K, 3000K, 3500K, 4000K, 4500K, 5000K				2700K, 3000K, 3500K, 4000K, 4500K, 5000K, 5700 K, 6500 K
Lumen Maintenance (L ₇₀)	25,000 hours residential, 35,000 hours commercial				
CRI	75				
Off-state Power	Products shall not draw power in the off state ⁴				
Power Factor	0.70 residential, 0.90 commercial				
Operating Frequency	120 Hz				

Other, requirements include: color spatial uniformity, color maintenance, thermal management, electromagnetic and radio frequency interference, noise, and transient protection. There is a reduced air leakage requirement for residential recessed, surface, and pendant-mounted downlights. Products designed to replace fluorescent tubes, hi-bays, or troffers are not included in these criteria.

¹ Including but not limited to: flush-mounts, close-to-ceiling, and ceiling fan light kits

² Including but not limited to: ceiling fan light kits, track lights, and rail lights

³ Luminaire aperture must be less than or equal to 8 inches in diameter (if circular) or on any side (rectangular).

⁴ Exception: Products with integral occupancy, motion, photo-controls or individually addressable fixtures with external control and intelligence are exempt from this requirement. The power draw for such products shall not exceed 0.5 watts when in the off state.

E3: APPENDIX OF RESOURCES

ENERGY STAR® LED Light Bulbs Key Product Criteria. Current criteria can be accessed at;
 (http://www.energystar.gov/index.cfm?c=iledl.pr_key_product)

Performance Characteristics:	Current Criteria:
Correlated Color Temperature (CCT)	Nominal CCT: 2700K, 3000K, 3500K, or 4000K
Color Maintenance	The change of chromaticity over the minimum lumen maintenance test period (6000 hours) shall be within 0.007 on the CIE 1976 (u',v') diagram.
Color Quality (Color Rendering Index or CRI)	CRI >= 80, R9>0
Dimming	If a product is dimmable, packaging must state this. Minimum efficacy, light output, CCT, CRI, and power factor of dimmable lamps will be confirmed with the lamp operated at full power.
Warranty	A warranty must be provided for lamps, covering material repair or replacement for a minimum of three (3) years from the date of purchase.
Allowable Lamp Bases	Must be a lamp base listed by ANSI.
Power Factor	For lamp power <= 5W and for low voltage lamps, no minimum power factor is required. For lamp power >= 5W, power factor must be = 0.70.
Minimum Operating Temperature	Integral lamp shall have a minimum operating temperature of -20°C or below.
LED Operating Frequency	>= 120 Hz
Electromagnetic and Radio Frequency Interference	Integral LED lamp must meet the appropriate FCC requirements for consumer use (FCC 47CFR Part 15).
Audible Noise	Integral lamp shall have a Class A sound rating.
Transient Protection	Power supply shall comply with IEEE C.62.41-1991, Class A operation. The line transient shall consist of seven strikes of a 100kHz ring wave, 2.5kV level, for both common mode and differential mode.
Operating Voltage	Lamp shall operate at rated nominal voltage of 120, 240, or 277 VAC, or at 12 or 24 VAC or VDC.

ENERGY STAR® Program Requirements for Integral LED Lamps

http://www.energystar.gov/ia/partners/manuf_res/downloads/IntegralLampsFINAL.pdf

ENERGY STAR® Integral LED Lamp Specification Technical Clarifications Issued August 25, 2010

http://www.energystar.gov/ia/partners/manuf_res/downloads/Integral_LED_Lamps_Technical_Clarifications.pdf

Suggested Testing Services

(From CALiPER and [DOE Manufacturer's Guide](#))

http://www.energystar.gov/ia/partners/manuf_res/downloads/ENERGYSTAR_Manufacturers_Guide_30Sept08.pdf)

LM-79 and LM-80 Testing Laboratories

Integrating Sphere (LM-79 Section 9.1 and 9.2)

- Independent Testing Laboratories, Inc. – Boulder, CO <http://www.itlboulder.com/>
- Lighting Sciences, Inc. – Scottsdale, AZ <http://www.lightingsciences.com/home/>
- Lighting Research Center; Rensselaer Polytechnic Institute – Troy, NY <http://www.lrc.rpi.edu/>
- Luminaire Testing Laboratory, Inc. – Allentown, PA <http://www.luminairetesting.com/>

Goniophotometry (LM-79 Section 9.3)

- Independent Testing Laboratories, Inc. – Boulder, CO <http://www.itlboulder.com/>
- Luminaire Testing Laboratory, Inc. – Allentown, PA <http://www.luminairetesting.com/>
- Lighting Sciences, Inc. – Scottsdale, AZ <http://www.lightingsciences.com/home/>

UL 1598 or UL 153 testing Nationally Recognized Testing Laboratories (NRTLs)

- Canadian Standards Association (CSA);
- Intertek Testing Services NA, Inc. (ITSNA);
- MET Laboratories, Inc. (MET);
- NSF International (NSF);
- SGS U.S. Testing Company, Inc. (SGSUS);
- TUV America, Inc. (TUVAM);
- TUV Product Services GmbH (TUVPSG);
- TUV Rheinland of North America, Inc. (TUV);
- Underwriters Laboratories Inc.(UL); and
- Wyle Laboratories, Inc. (WL).

A complete and current listing of NRTLs: <http://www.osha.gov/dts/otpca/nrtl/>