

ENERGY STAR Lighting CB Webinar

November 20, 2013

Webinar Agenda



- Introduction
- Specification Testing Changes
- Utilizing Existing Data
- Hot Topics in Certification
- Summary & What's Next

Introduction



Taylor Jantz-Sell

U.S. Environmental Protection Agency - (202) 343-9042

jantz-sell.taylor@epa.gov

Tanya Hernandez, PE, LC

ICF International - (919) 294-9004

tanya.hernandez@icfi.com

Austin A. Gelder

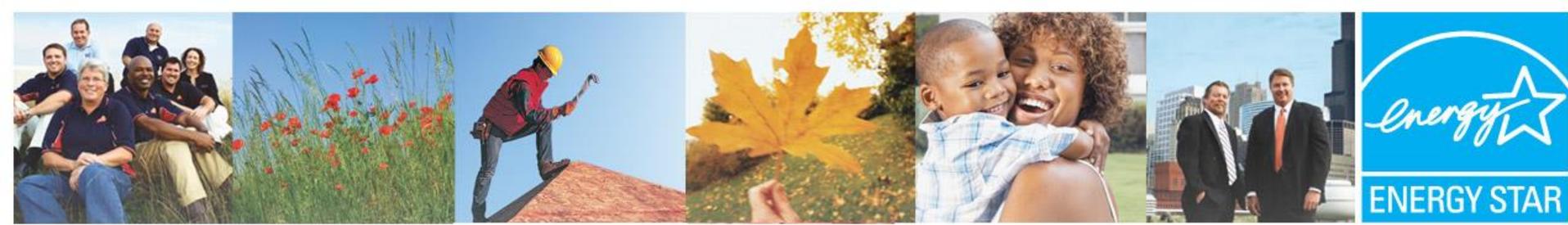
ICF International - (770) 419-9249

austin.gelder@icfi.com

Certification Body Resources



- CB Resources site:
 - www.energystar.gov/cbresources
- Lamps Specification site:
 - www.energystar.gov/lamps
- Emails:
 - Lighting specific
 - lighting@energystar.gov
 - General certification questions
 - certification@energystar.gov



Specification Testing Changes

Specification Testing Changes



- New [ENERGY STAR Test Methods and Recommended Practices](#) published with the Lamps V1.0 Specification
- Test Methods
 - Require laboratory accreditation
- Recommended Practices
 - Do not require laboratory accreditation

New Test Methods



- Elevated Temperature Life Testing (ETLT)
 - For life testing and lumen and color maintenance of higher wattage and directional lamps
- Ambient Temperature Life Testing (ATLT)
 - For life testing and lumen and color maintenance of lower wattage, decorative and lamps that are not intended for enclosed or recessed fixtures
- Elevated Temperature Light Output Ratio (ETLOR)
 - For directional lamps that go through ETLT
- Start Time
 - For all lamps
- Run Up Time
 - For all CFLs



New Test Methods



- The Compact Fluorescent Lamps and Integral LED Lamps specifications included test methods
 - Some were included in Annex or Appendix form in the specification
 - Some new test methods address requirements which did not have a test method, such as Start Time and Run-Up Time
- All new ENERGY STAR Test Methods must be performed by an accredited laboratory.

Elevated Temperature Life Testing



- Required for a wider range of lamps
 - Omnidirectional CFL and LED
 - Directional Lamps
- Exemptions:
 - Decorative lamps
 - Lamps not rated for enclosed or recessed fixtures

Elevated Temperature Life Testing



- 3 testing options:
 - Option A: Operate lamps in a recessed can fixture
 - Passive temperature control
 - Option B: Operate lamps in an elevated temperature apparatus
 - Active temperature control
 - Option C: Operate lamps in an elevated temperature space
 - Active temperature control

Elevated Temperature Life Testing



- Option A available for all lamps requiring ETLT
- Two different temperatures for Options B and C
 - $45^{\circ}\text{C} \pm 5^{\circ}\text{C}$
 - Omnidirectional lamps $\geq 10\text{W}$
 - Directional lamps $\leq 20\text{W}$
 - $55^{\circ}\text{C} \pm 5^{\circ}\text{C}$
 - Directional lamps $> 20\text{W}$

Ambient Temperature Life Testing



- No retesting anticipated
 - Nearly identical test conditions and procedures as the Integral LED Lamps specifications
 - Organized and clarified into a life test method for SSL Lamps
- Certification Body needs to review test conditions before accepting

Elevated Temperature Light Output Ratio



- Comparison of the light output at ambient temperature vs. elevated temperature
- Nearly identical test conditions and procedures as the CFL specifications
- Directional SSL lamps will need this test
 - Exemption for lamps not required to undergo ETLT

Start Time Test



- **NEW** test method developed to address the consistency issue of the start time requirement
- **ALL LAMPS** must be evaluated using new test method before being certified to Lamps V1.0
- Start Time Test results may impact the Rapid Cycle Stress Testing needed for CFLs

Run Up Time Test



- **NEW** test method developed to address the consistency issue of the run up requirement
- **ALL CFL LAMPS** must be evaluated using new run up test method before being certified to Lamps V1.0
- Requirements simplified to covered or non-covered
 - No more trying to determine if a lamp has amalgam

Dimming Testing (NEW)



- ***Recommended Practices*** to address dimming compatibility and performance
 - Developed with stakeholders and laboratories
 - Includes test report requirements
- **Lab Requirements:**
 - NOT required to be performed by an accredited laboratory
 - May be updated in future specification revision

Dimming Testing

- Primary data collection from partners will be the Dimming Data Collection Sheet
 - Limited values will be collected through QPX
 - CBs send data sheets to lighting@energystar.gov
- Tests are designed to be flexible with equipment used
 - Integrating sphere is not required
 - Absolute and/or relative methods are acceptable
 - An anechoic chamber is not required

Dimming Testing Refresher



- Testing Setup
 - 5 dimmers per lamp from at least 2 manufacturers
- 2 configurations per dimmer
 - 1 lamp on the dimmer and 4 lamps on the dimmer
- 3 test points per configuration
 - Baseline Light Output (BLO)
 - Maximum Light Output (MaxLO)
 - Minimum Light Output (MinLO)

Light Output On a Dimmer



- One test method for two requirements:
 - Minimum Light Output on a dimmer
 - Maximum Light Output on a dimmer
- Can be performed concurrently with flicker testing

- Can be performed concurrently with light output on a dimmer testing
 - Frequency is measured at BLO
 - Flicker index and percent flicker are both measured at all points
 - Waveform data is captured and passed on to EPA by the partner

- Not required to be performed in an anechoic chamber
 - “The sound chamber shall provide an environment suitable for the sound testing of lamps. External sources of noise shall be minimized.”
- Two options for testing setups
 - 1 microphone at 6 different positions, OR
 - 6 microphones around the lamp



Certifying Products with Existing Performance Data

Use of Existing Data

- Can the existing data be used?
 - Yes, with some caveats
- Will additional testing be necessary?
 - Yes, as discussed earlier with some of the new ENERGY STAR test methods and specification requirements
- Can CBs get more details?
 - Of course!

Considerations For Existing Data



- Age of data
 - Can the partner substantiate that the product is unchanged from the date of testing?
 - Note: CFL 4.0 originally called for retesting every 36 months
- Test method
 - Has the test method been updated?
 - If so, are the test conditions consistent?
- Laboratory Recognition
 - Was lab was properly accredited when testing was completed?
 - Is the laboratory recognized by the EPA for Lamps V1.0?
- Some requirements may necessitate additional testing or partial re-testing



Lumen Maintenance and Lifetime



- Many products will be able to use existing data
 - Non-ETLT
 - CFL non-ETLT no change from CFL V4.3
 - ATLT for SSL consistent with non-ETLT from Integral LED Lamps V1.4
 - ETLT
 - Many products with ETLT will have consistent conditions and will not require re-testing
 - Some products may need ETLT (many omnidirectional CFL)
 - Some higher wattage products may need ETLT at a higher temperature situation
- Consider lamp orientations from CFL V4.3
 - Use of data may require labeling indicating performance ratings are based on that orientation as applicable

Lumen Maintenance and Lifetime



- Examples:
 - **7W PAR20 LED:** Certification to Integral LED Lamps specification did not require ETLT, but Lamps V1.0 requires ETLT at $45^{\circ}\text{C} \pm 5^{\circ}\text{C}$
 - If it is intended for use in recessed or enclosed fixtures
 - **21W PAR38 LED:** Certification to Integral LED Lamps specification required ETLT at 45°C ; Lamps V1.0 requires ETLT at higher temperature, 55°C because its $>20\text{W}$
 - An 18W PAR38 LED could utilize 45°C data

Lumen Maintenance and Lifetime



- More examples:
 - **13W Bare Spiral CFL:** Certification to the CFL specification did not require ETLT, but Lamps V1.0 requires ETLT at $45^{\circ}\text{C} \pm 5^{\circ}\text{C}$
 - If it is intended for use in recessed or enclosed fixtures.
 - **23W R40 CFL:** CFL specification required ETLT at 55°C , so re-testing is likely not needed
 - If it is intended for use in recessed or enclosed fixtures.
 - **18W R40 CFL:** Certification to the CFL specification required ETLT at 55°C , as this is more stringent than Lamps V1.0, the lamp does not require re-testing
 - If it is intended for use in recessed or enclosed fixtures.

Rapid Cycle Stress Test



- Many LED and CFL lamps will require additional cycles
 - LEDs with a rated lifetime of 25,000 hrs
 - CFLs with a start time of ≥ 100 ms
 - If the original samples used for cycling **are available**:
 - Additional test cycles can be conducted on the samples to meet the number of cycle requirements
 - If the original samples **are not available**:
 - Lamp model must be re-tested

Rapid Cycle Stress Test

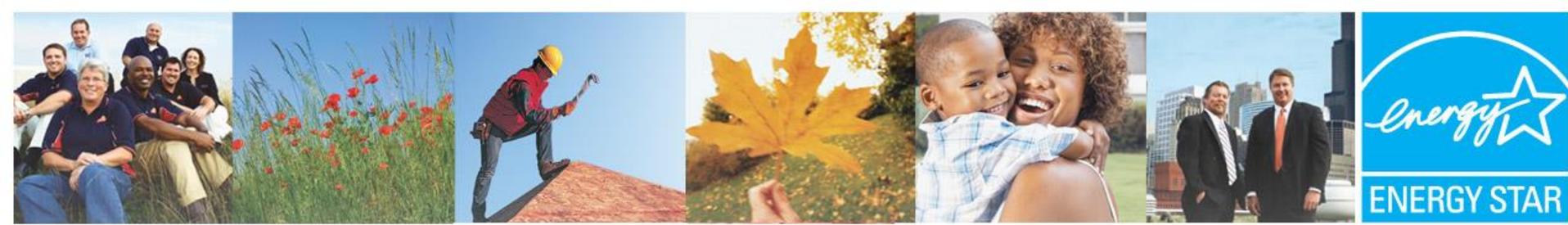


- Examples:
 - **7W PAR20 LED 25,000 hour life:** Certification to the Integral LED Lamps specification required 12,500 cycles in, but Lamps V1.0 requires 15,000.
 - **13W CFL Bare Spiral 12,000 hour life 172 ms Start Time:** Certification to the CFL specification required 6,000 cycles, but Lamps V1.0 requires 12,000 cycles
 - If the same CFL has a 72 ms start time it would not need additional testing

Photometry



- Light Output and Luminous Efficacy
 - Testing referenced in older specifications is consistent with (or tighter than) current testing and is likely usable
- Luminous Intensity
 - All PAR and MR lamps need the data, which SSL lamps will have and should be usable but CFLs will need testing
 - Omnidirectional SSL performance requirements have been updated, requiring analysis of distribution data
 - Decorative lamps now require intensity distribution testing to meet the zonal lumen requirement



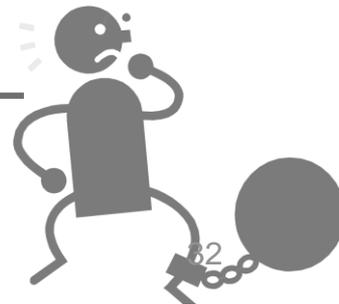
Hot Topics

Certification Issues of Note

WMTL and SMTL Data Portability



- Witnessed Manufacturer Testing Laboratory (WMTL) and Supervised Manufacturer Testing Laboratory (SMTL) data is only usable with the CB that the laboratory is enrolled with
- Test data from a WMTL or SMTL is NOT portable between CBs
 - LM-80 data is CB specific
 - Private labelers must use same CB as OEM
- NOTE: A manufacturer laboratory can participate in multiple CBs' WMTL or SMTL programs



Classifying Lamps

- Use caution with similar nomenclature lamps:
 - B (Bulged) is decorative, BR (Bulged Reflector) is directional, BT (Bulged Tubular) is omnidirectional.
- Decorative Lamps
 - No “G19” lamps in the ENERGY STAR Specification
 - A non-standard snow cone faux A-lamp is NOT a decorative globe



Classifying Lamps



- Standard vs. Non-Standard:
 - CFLs may be standard or non-standard
 - LED Lamps must have a standard shape
- Omnidirectional ANSI Standard lamps should target the ANSI MOL and MOD

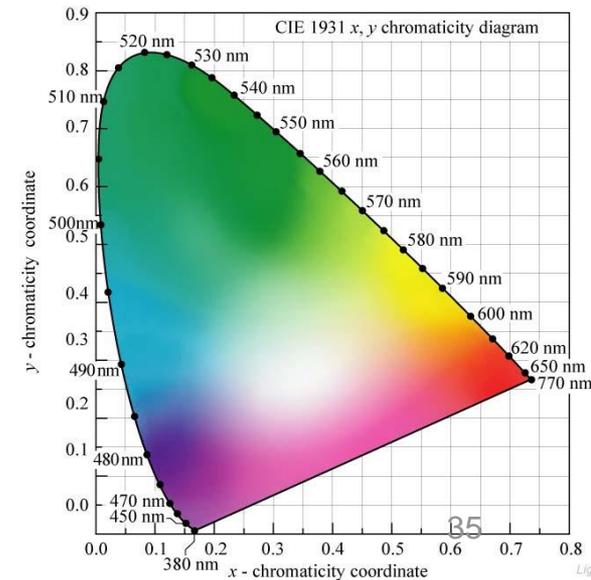


CFL Topics



- Equivalency Claims – 2 scenarios
 - Lamp meets ANSI MOL and MOD
 - May claim equivalency to wattage and shape
 - Lamp does not meet ANSI MOL and MOD
 - My claim equivalency to wattage without referencing shape

- Chromaticity Requirements:
 - 7-Step Chromaticity document posted on the [Lamps Specification Page](#)



CBCP Tool and Beam Angles



- CBCP Tool applies to all PAR and MR Lamps
- Updated and now makes clear the capabilities and limitations for allowable beam angles and wattages
 - www.energystar.gov/LampsCBCP
 - Max angle of 65° for PAR lamps
 - Max angle of 50° for MR lamps
 - Wattages based on the data set



CBCP Tool and Beam Angles



ENERGY STAR® Lamp Center Beam Intensity Benchmark Tool

PAR Lamps

Target Incandescent/Halogen Lamp Parameters

Enter PAR type/value:	38	lamp diameter in 1/8 of in
Enter Nominal Lamp Wattage*:	300	watts
Enter Nominal Beam Angle**:	25	degrees

The lamp wattage entered is outside the range that can be calculated. Please enter a nominal lamp wattage in accordance with the table below and between 40 and 250.

Minimum Center Beam Intensity: **See note** cd

Term	Coefficient	PAR Type	Nominal Wattage	Beam Angle	Predicted Log CBCP	Log CBCP Two-sigma Lower Bound	Predicted CBCP	CBCP Two-sigma Lower Bound
Intercept	5.5102112	38	ERROR	25	8.885	8.583	7222	5338
PAR	0.1395448							
Watts	0.0448725							
Beam Angle	-0.088493							
PAR*Watts	-0.000521							
PAR*Beam Angle	-0.000719							
PAR ²	-0.001192							
Watts ²	-0.0005981							
Beam Angle ²	0.0008786							
Root Mean Square Error	0.151113							



*Nominal wattage per ANSI C78.21-2011: American National Standard - Incandescent lamps: PAR and R Shapes. See Table 1 in Part II - Lamp Classes.

Only the wattages listed below can be entered as the nominal lamp wattage for each respective diameter.

Diameter	Permitted Wattages
16	40, 45, 60, 75
20	50
30S	40, 45, 50, 60, 75
30L	50, 75
38	40, 45, 50, 55, 60, 65, 75, 85, 95, 100, 120, 150, 250

**Nominal beam angle per ANSI C78.379-2006: American National Standard for Electric Lamps - Classification of the Beam Patterns of Reflector Lamps. See Section 4.1 Nominal beam angle classifications, and Section 4.3 Beam angle tolerance of PAR and R lamps.

Labeling Enclosed/Recessed



- For lamps to be exempt from ETLT, they must be labeled (lamp and packaging) as follows:
 - Omnidirectional lamps labeled “not for use in enclosed fixtures”
 - Any lamp labeled “Not for use in recessed fixtures”
 - If labeling does not appear, on both lamp and packaging, it’s not exempt



Product Families



- Also known as Allowable Variations
- Purpose is to facilitate sharing of data where appropriate to reduce testing burden while maintaining confidence in product performance

POP QUIZ



- A manufacturer has a PAR30L LED Lamp and they want to add allowable variations:
 - Tested Lamp:
 - PAR30L
 - 15 Watts 900lm
 - 3000K
 - 24 degree beam angle
 - Black anodized aluminum swirl fin design heat sink
 - E26 base



POP QUIZ

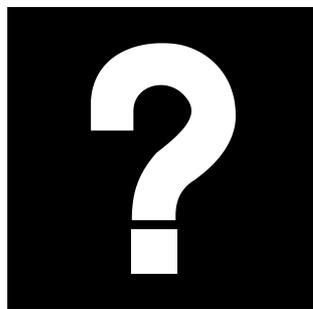
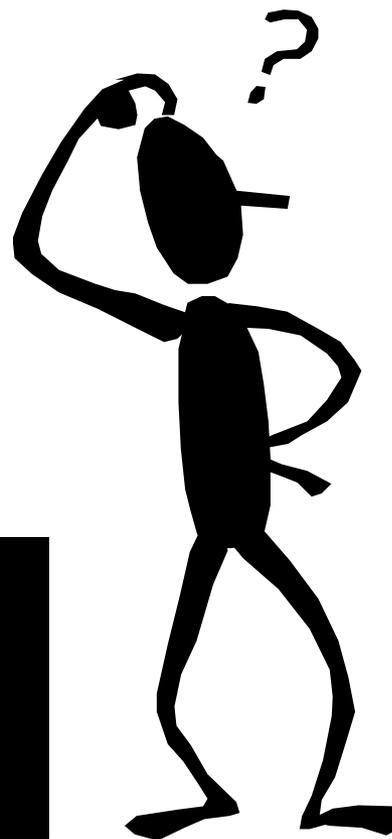


- A manufacturer has a PAR30L LED Lamp and they want to utilize the following as allowable variations:
 - PAR30S
 - NO
 - 18 Watts 975lm
 - NO
 - 2700K, 4000K, 5000K
 - YES (if partner determines 3000K represents worst case)
 - 14, 42 degree beam angles
 - YES
 - Bare aluminum, green anodized, and white painted heat sinks –
 - YES to bare and anodized
 - NO to painted
 - Straight fin design heat sink
 - NO
 - E26 and GU24 base
 - YES

- 15 Watts 900lm
- 3000K
- 24 degree beam angle
- Black anodized aluminum swirl fin design heat sink
- E26 base

Questions

- Time for some Q&A!





Summary and What's Next

Takeaways for CBs

- Determining acceptance of existing test data is the CB's responsibility
 - Consider the age of the data and what changes the manufacturer has made since the original testing
 - Confirm the laboratory's recognition
- Testing will be required for all lamps, but effort has been made to minimize re-testing

Takeaways for CBs

- When discussing additional testing needed for certification, evaluate potential variations to maximize the return on the testing
- When in doubt, reach out to:
 - lighting@energystar.gov

What's Next



- ENERGY STAR Webinar Series – Dec 5th
 - Lighting Update 1:00-2:00 PM EST
 - Updates on the lighting program, specifications, and market trends
 - Lighting Certification 2:30-4:00 PM EST
 - In-depth discussion on lighting product certification
 - Detailed review of the lamps and luminaires specifications
 - Product classification
 - Inseparable luminaires
 - Certified Subcomponent Database (CSD)
 - Family groupings

What's Next



- LIGHTFAIR® International 2014
- ENERGY STAR Lighting Certification Short Course
- Monday, June 2, 2014 – 2:00PM – 5:00PM
- LIGHTFAIR Pre-Conference program

QPX Templates



- EPA requested feedback on data fields
 - ONLY 1 CB replied
 - Need more feedback to proceed
 - Costly for EPA and CBs to change templates after implementation
 - Find any potential roadblocks before started
- Feedback is **very important** for smooth QPX submissions



Laboratory Recognition for Lamps V1.0



- Lab guide recently [posted online](#)
- Laboratories will:
 - Need new test methods on their scope of accreditation
 - Have to apply for recognition in one (1) or more categories:
 - Directional CFL
 - Omnidirectional and Decorative CFL
 - Directional LED
 - Omnidirectional and Decorative LED



Companion Document



COMING SOON!

LEARN MORE AT energystar.gov

Lamps V1.0 Specification Category	Types	Wattages	9.1 Luminous Efficacy	9.2 Light Output	9.3 Elevated Temperature Light Output Ratio	9.4 Center Beam Intensity	9.5 Luminous Intensity Distribution	9.6 Correlated Color Temperature	9.7 Color Rendering	9.8 Color Maintenance	9.9 Color Angular Uniformity	10.1 Lumen Maintenance - Ambient Temperature	10.1 Lumen Maintenance - Elevated Temperature	10.3 Rapid Cycle Stress Test	11.1 Electrical Safety	11.2 Power Factor	11.3 Frequency	11.4 Start Time	11.5 Run-Up Time	11.6 Transient Protection	12.1 Dimming - Maximum Light Output ¹	12.2 Dimming - Minimum Light Output ¹	12.3 Dimming - Flicker ¹	12.4 Dimming - Noise ¹	
Omnidirectional (Integral LED Lamps V1.4: Omnidirectional, some non-standard)	All	< 10W or Not for use in enclosed fixtures	Green	Green	White	White	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Red	Red	Red	Red	
		Omnidirectional >= 10W that are rated for enclosed fixtures	Green	Green	White	White	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Red	Red	Red	Red
Directional (Integral LED Lamps V1.4: Directional lamps)	PAR and MR	Directional <=20W	Green	Green	Red	White	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Red	Red	Red	Red	
		Directional > 20W	Green	Green	Red	White	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Red	Red	Red	Red
		Directional (Not for use in enclosed fixtures)	Green	Green	White	White	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Red	Red	Red	Red
	R, BR, ER	Directional <=20W	Green	Green	Red	White	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Red	Red	Red	Red
		Directional > 20W	Green	Green	Red	White	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Red	Red	Red	Red
		Directional (Not for use in enclosed fixtures)	Green	Green	White	White	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Red	Red	Red	Red
Decorative (Integral LED Lamps V1.4: Decorative lamps)	Decorative	All Wattages	Green	Green	White	White	Red	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Red	Red	Red	Red	
	Decorative Globe	All Wattages	Green	Green	White	White	Red	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Red	Red	Red	Red	

1: For lamps marketed as dimmable

Key	
White	Not applicable
Green	Possible retest
Red	Required new test or retest
Yellow	No retest anticipated





Thank you!