



EPA-Recognized Lighting Lab Guide

Updated October 13, 2016

Purpose of Document

This document, created for lighting laboratories, accreditation bodies (ABs), and certification bodies (CBs) provides clarification and assistance regarding the process a laboratory must follow, and methods of measurement to which a laboratory must be accredited in order to gain EPA recognition for testing to one or more ENERGY STAR lighting product specifications and subcategories. Testing in an EPA recognized laboratory is a requirement for third-party certification, and thereby, ENERGY STAR certification. This guide covers the process of laboratories applying for EPA recognition, categories for EPA recognition, testing, and references.

Categories for ENERGY STAR Recognition

EPA laboratory recognition falls into three basic categories:

1. Recognition for testing **luminaires** (*and subcomponents of luminaires*) ;
[Luminaires V2.0 Recognition section of this document](#)
2. Recognition for testing **lamps** ; and
[Lamps V2.0 Recognition section of this document](#)
3. Recognition for testing **decorative light strings** : the ENERGY STAR Program Requirements for Decorative Light Strings (DLS) Test Procedure and Eligibility Criteria, Appendix A, outlines the methods of measurement for DLS. Therefore, either the full title of the DLS specification or the full title of the DLS specification and the title and reference to Annex A should appear in the Scope of Accreditation.

Recognition for testing luminaires and lamps is further subdivided by subcategories based on the type of luminaire and light source used.

The required test methods are listed under the Green "Method of Measurement" section of this document.

[Method of Measurement Table in this document](#)

Related Resources

For information on EPA's recognition processes, including the application for lab recognition, product specifications, or other methods of measurement and standards referenced in this guide, please visit the ENERGY STAR Laboratory Resources page.

[Link](#)

List of EPA-recognized lighting laboratories.

[Link](#)

Questions about Department of Energy (DOE) test procedures may be directed to Lucy Debutts:

Lucy.Debutts@ee.doe.gov

Questions about this document may be directed to:

lighting@energystar.gov

Laboratories must apply for EPA recognition. The steps to do so are outlined below.

Application Process

If a laboratory is planning to seek EPA recognition as an accredited laboratory, the application process entails the following:

1. Read and ensure compliance with the Conditions and Criteria for Recognition of Laboratories for the ENERGY STAR Program.

[Conditions and Criteria for Recognition of Laboratories](#)

2. Complete and sign the Application for Recognition of Laboratories

[Application for Recognition of Laboratories](#)

3. Submit the application with a scanned version of the laboratory's scope of accreditation to:

Certification@energystar.gov

If a laboratory is seeking EPA recognition as a Witnessed or Supervised Manufacturers' Testing Laboratory (W/SMTL), the typical avenue to EPA recognition for unaccredited manufacturers' laboratories, the laboratory must participate in an EPA-recognized CB's W/SMTL program. Upon enrolling the laboratory in its W/SMTL program, the CB will submit the name of the laboratory and W/SMTL application to EPA for recognition as a W/SMTL for specific ENERGY STAR product category/categories.

Please note that data from test reports generated by laboratories within the W/SMTL program will be accepted only by the CB(s) with which they enroll. This topic is addressed as a frequently asked question on the ENERGY STAR [Link](#)

As an accredited laboratory or W/SMTL, the laboratory will need to maintain contact with EPA regarding any changes to the scope of accreditation, and participate in inter-laboratory correlation testing per EPA Directive #2011-03: Proficiency Testing and Inter-Laboratory Comparison Testing Requirements for Lighting Laboratories.

[Link](#)

Scope of Accreditation

The scope of accreditation is a list of methods of measurement included in a laboratories accreditation to ISO 17025.

Methods of Measurement are documents that must appear in a laboratory's scope of accreditation in order for the laboratory to earn EPA recognition for each subcategory. Each Method of Measurement document is listed in the specifications next to the relevant requirement(s). A list of these documents is provided on the "Methods of Measurement" section of this document.

Reference documents are listed in the specifications next to relevant requirements and listed on the last section of this guide for a quick handy reference. While they are not required to be on a lab's scope of accreditation they are essential for understanding and applying the requirements for which they were referenced. For example, EPA does not require accreditation to IES TM-21-11 but does require that the ENERGY STAR TM-21 Calculator be used to substantiate lumen maintenance life claims.

Directive 2011-02 clarifies EPA's requirements for recognized ABs to list methods of measurement on laboratory scopes of accreditation. With respect to lighting laboratories, it states, "In the case of a laboratory applying for EPA-recognition to test lighting products pursuant to ENERGY STAR qualification, the EPA-recognized AB must include at a minimum in the laboratory's scope of accreditation the titles of the lighting-related methods of measurement to which the AB is accrediting the laboratory. This may be in addition to or instead of the title of the relevant ENERGY STAR specification. Methods of measurement shall be recorded on the Scope of Accreditation as they appear in ENERGY STAR Guide to EPA Laboratory Recognition by Lighting Category [i.e. this guide]." In the case of a laboratory participating as a W/SMTL, the CB operating the W/SMTL program shall maintain a list of the ENERGY STAR product categories the W/SMTL agreement covers.

[Link](#)

Most methods of measurement are from national or international organizations such as American National Standards Institute (ANSI) or Illuminating Engineering Society (IES). Please note that some ENERGY STAR specifications include exceptions or modifications regarding tests for specific products.

If the laboratory has been recognized previously for one or more product categories, the laboratory must ensure the AB updates its scope of accreditation commensurately with updated ENERGY STAR Specifications and Test Methods in accordance with the scheduled audits. Any changes to the scope of accreditation that affects a laboratory's recognition must be immediately reported to EPA.

Performance Testing Requirements

EPA recognizes lighting laboratories for photometric and electrical performance testing only. Transient protection may be on the scope of a laboratory's accreditation or performed by another accredited laboratory. The ENERGY STAR lighting specifications state that electrical safety testing must be carried out by one of the Occupational Safety and Health Administration's (OSHA) nationally recognized testing laboratories (NRTL).

Safety testing different laboratory requirements are specified per OSHA. A full listing of OSHA NRTLs can be found on the OSHA website.

[Link](#)

OSHA NRTLs may perform In Situ Temperature Measurement Testing (ISTMT) for SSL products, as can any lab whose scope of accreditation includes relevant sections/documents designated with an ‡ on the "Methods of Measurement" table in this document.

Laboratory Recognition for ENERGY STAR Luminaires Version 2.0 Specification

[Link](#)

Laboratory recognition subcategories for testing luminaires are based on luminaire type (e.g., directional or non-directional) and light source technology (e.g., solid-state or fluorescent) due to the different methods of measurement required to adequately test luminaires.

Also included in the luminaires category are subcomponents such as lamps, ballasts, and platforms. EPA lists certified luminaire subcomponents in the Certified Lighting Subcomponent Database (CSD). The database helps luminaire partners' source components such as lamps and ballasts that meet the ENERGY STAR Luminaires specification performance requirements.

Note, luminaire partners are not limited to using the subcomponents on the CSD. They may use other subcomponents for which subcomponent manufacturers have provided test reports from EPA-recognized laboratories. Alternatively, luminaire partners may select subcomponents not listed on the CSD, and may themselves have the subcomponents tested by an EPA-recognized laboratory to ensure they will meet the requirements attributable to the subcomponent that are set forth in the ENERGY STAR specification.

See the "Methods of Measurement" table for the list of documents that must appear in a laboratory's scope of accreditation in order for the laboratory to earn EPA recognition for each subcategory. In order to perform In Situ Temperature Measurement Testing (ISTMT) of solid-state luminaires the Laboratory must be accredited for the appropriate ISTMT methods designated with an ‡ for the product under test. The certification body will review the test report to ensure the lab is accredited for the appropriate ISTMT method based upon the type of product

Reference documents are listed in the specifications next to relevant requirements and listed in the last section of this guide for a quick handy reference. While they are not required to be on a lab's scope of accreditation they are essential for understanding and applying the requirements for which they were referenced.

Laboratories can be recognized for:

Solid-State (Directional Luminaires)

Directional solid state luminaires are measured using luminaire photometry; measurements for light output and light characteristics are conducted on the entire luminaire with the light source installed, accounting for optical losses and thermal effects within the fixture.

A luminaire must fall within one of the directional categories included in the Specification Scope & Luminaire Classification section of the ENERGY STAR Luminaires specification. Note, if the luminaire does not fall within the categories specifically stated in the Directional box in the Specification Scope & Luminaire Classification section, the luminaire is categorized as non-directional. Inseparable solid state lighting (SSL or LED) luminaires are an exception, and are always treated as directional.

Solid-State (Non-Directional Luminaires and Subcomponents)

Non-directional solid state (SSL) luminaires are evaluated using source photometry, similar to non-directional fluorescent luminaires. In the case of non-directional solid state luminaires, the source is described as an LED lamp if it utilizes an ANSI base to connect to line voltage, or an LED light engine if the source utilizes a non-ANSI connector. To be listed on the CSD, LED light engines and integrated LED lamps are required to be tested according to the IES LM-82-12 test procedure rather than IES LM-79-08.

LED Packages, Arrays, and Modules

EPA recognition is available for laboratories performing the IES LM-80-08 Method for Measuring Lumen Maintenance of LED Light Sources test.

There are two types of solid state retrofit kits: SSL downlight retrofits and SSL surface mount retrofit kits. The SSL downlight retrofits are a type of solid state luminaire intended to install into an existing downlight, replacing the existing light source and related electrical components, typically employing an ANSI standard lamp base, either integral or connected to the downlight retrofit by wire leads, and is a retrofit kit classified or certified to UL 1598C. SSL retrofit kits that bypass the existing compact fluorescent lamp (CFL) ballast are not covered by the ENERGY STAR V2.0 Luminaires Specification (nor were they covered by the ENERGY STAR V1.2 Luminaires Specification). SSL surface mount retrofit kits are a type of solid state lighting product intended to replace existing light sources and systems including incandescent and fluorescent light sources in previously installed luminaires that already comply with safety standards. These kits replace the existing light source and related electrical components, and are classified or certified to UL 1598C. This may employ an ANSI standard lamp base, either integral or connected to the retrofit by wire leads.

Fluorescent (Non-Directional Luminaires)

Non-directional fluorescent luminaires are measured using source photometry, meaning the measurement for light output and light characteristics are defined by the source used. If the lamp and ballast's individual performance data are already listed on the CSD, or if the performance data for the lamp and ballast combination tested together (the "platform") is listed, the luminaire partner's testing burden is reduced since the source has already been tested through the third-party certification system.

For example, a non-directional decorative luminaire that uses a pin-based, separately ballasted compact fluorescent lamp (CFL) as a light source can be certified using pre-existing data. The light output and efficacy of the light source is based on the lamp and ballast data in the CSD, or based on data supplied to the CB that originated from an EPA-recognized laboratory. The lamp and ballast still must be tested within the fixture to ensure the ballast is operated within the appropriate temperature range, and a safety listing for the luminaire would need to be

See the "Methods of Measurement" table for the list of documents that must appear in a laboratory's scope of accreditation in order for the laboratory to earn EPA recognition for Non-directional SSL Luminaires.

The "Reference Documents" table lists other documents referenced by the ENERGY STAR specifications for each lamp subcategory. Reference documents are not required to appear on a laboratory's scope of accreditation. However, in certain instances the certification process requires their use.

Fluorescent (Directional Luminaires)

Directional fluorescent luminaires are measured using luminaire photometry. The measurement for light output and light characteristics are defined by measuring the luminaire output with the light source installed, which accounts for optical losses and thermal effects within the fixture.

A luminaire must fall within one of the directional categories included in the Specification Scope & Luminaire Classification section of the ENERGY STAR Luminaires specification. Note, if the luminaire does not fall within the categories specifically stated in the Directional box in the Specification Scope & Luminaire Classification section, the luminaire is categorized as non-directional.

Fluorescent Subcomponents (Lamps and Ballasts)

Compact fluorescent lamps and ballasts for these lamps may be tested and certified for listing on the CSD.

Note, while subcomponents listed in the CSD are useful to ENERGY STAR luminaire partners, products listed in this database are not themselves be ENERGY STAR certified. These subcomponents may not carry any of the ENERGY STAR marks on the product itself, on its packaging, or in associated literature either printed or electronic, and may not be referred to as ENERGY STAR qualified, certified, approved, or the like.

Laboratory Recognition for ENERGY STAR Lamps Version 2.0 Specification

[Link](#)

The ENERGY STAR Lamps Specification covers energy efficient replacements for incandescent lamps utilizing fluorescent and solid state technologies. Testing requirements can vary depending on the type of lamp being tested, and there are four categories of recognition based on the requirements:

Laboratories can be recognized for:

- Solid-State (Directional Lamps)
- Solid-State (Omnidirectional and Decorative Lamps)
- Compact Fluorescent (Directional Lamps)
- Compact Fluorescent (Omnidirectional and Decorative Lamps)

Note:

Testing of LED lamps requires the use of a goniophotometer. Testing of directional LED lamps will require a goniophotometer with a colorimeter or spectroradiometer in order to perform intensity and color angular uniformity tests.


The ENERGY STAR Lamps Version 2.0 Specification defines directional lamps as "ANSI standard PAR and MR lamps having at least 80% light output with a solid angle of π steradians, corresponding to a cone with an angle of 120°, self-ballasted compact fluorescent forms that utilize a reflector, and ANSI standard R, BR and ER shapes."

See the "Methods of Measurement" table for the list of documents that must appear in a laboratory's scope of accreditation in order for the laboratory to earn EPA recognition for each Lamp subgroup.

Reference documents are listed in the specifications next to relevant requirements and listed in the last section of this guide for a quick handy reference. While they are not required to be on a lab's scope of accreditation they are essential for understanding and applying the requirements for which they were referenced.


✓ Must Appear in a Laboratory Scope of Accreditation

‡ Required for Laboratories Performing ISTMT

 Lighting Methods of Measurement			Lamps				Luminaires							
			Solid-State		Compact Fluorescent		Solid-State			Fluorescent				
Method of Measurement		Document Title	ENERGY STAR Specification Section	Directional	Omnidirectional & Decorative	Directional	Omnidirectional & Decorative	Directional Luminaires	Non-directional Luminaires and Subcomponents	LED Packages, Arrays, and Modules	Directional Luminaires	Non-directional Luminaires	CSD - Ballasts	CSD - Lamps
ANSI	C62.41.2-2002	IEEE Recommended Practice on Characterization of Surges in Low Voltage (1000V and Less) AC Power Circuits	Transient Protection	✓	✓	✓	✓							
ANSI	C82.2-2002	Method of Measurement of Fluorescent Lamp Ballasts	Operating Frequency								✓	✓	✓	
ANSI	ANSI C82.77-10-2014	American National Standard for Lighting Equipment—Harmonic Emission Limits—Related Power Quality Requirements	Power Factor	✓	✓	✓	✓	✓	✓		✓	✓		
ANSI / UL	153:2002 (Sections 124-128A)	Standard for Safety of Portable Electric Luminaires	Luminous Efficacy and Output, Lumen Maintenance					‡	‡	‡				
ANSI / UL	1574:2004 (Section 54)	Standard for Safety of Track Lighting Systems	Luminous Efficacy and Output, Lumen Maintenance					‡	‡	‡				
ANSI / UL	1598:2008 (Sections 19.7, 19.10-16)	Standard for Safety of Luminaires	Luminous Efficacy and Output, Lumen Maintenance					‡	‡	‡				
ANSI / UL	1598C	Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits	Luminous Efficacy and Output, and Zonal Lumen Density					‡	‡					
CIE	Pub. No. 13.3-1995	Method of Measuring and Specifying Color Rendering of Light Sources	Color Rendering (CRI)	✓	✓	✓	✓	✓	✓		✓	✓		✓
CIE	Pub. No. 15:2004 <i>Note: not a method of measurement but requires accreditation.</i>	Colorimetry	CCT	✓	✓	✓	✓	✓	✓		✓	✓		✓
ENERGY STAR	Ambient Temperature Life Test Method Sept 2015	Ambient Temperature Life Test Method, September 2015	Ambient Temperature Life Test Method	✓	✓									
ENERGY STAR	Elevated Temperature Life Test Method Sept 2015	Elevated Temperature Life Test Method, September 2015	Elevated Temperature Life Test Method	✓	✓	✓	✓							
ENERGY STAR	Elevated Temperature Light Output Ratio Test Method Sept 2015	Elevated Temperature Light Output Ratio Test Method, September 2015	Elevated Temperature Light Output Ratio.	✓		✓								
ENERGY STAR	Run Up Time Test Method Sept 2015	Run-Up Time Test Method, September 2015	Source Run-up Time			✓	✓				✓	✓		
ENERGY STAR	Start Time Test Method Sept 2015	Start Time Test Method, September 2015	Source Start Time	✓	✓	✓	✓	✓	✓		✓	✓		

✓ Must Appear in a Laboratory Scope of Accreditation

‡ Required for Laboratories Performing ISTMT

 Lighting Methods of Measurement			Lamps				Luminaires						
			Solid-State		Compact Fluorescent		Solid-State			Fluorescent			
Method of Measurement	Document Title	ENERGY STAR Specification Section	Directional	Omnidirectional & Decorative	Directional	Omnidirectional & Decorative	Directional Luminaires	Non-directional Luminaires and Subcomponents	LED Packages, Arrays, and Modules	Directional Luminaires	Non-directional Luminaires	CSD - Ballasts	CSD - Lamps
IEC	62301 Edition 2.0 2011-01	Household electrical appliances - Measurement of standby power	Standby Power Consumption	✓	✓	✓	✓	✓		✓	✓		
IES	IES LM-80-08	IES Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays and Modules	Light Source Life, Lumen Maintenance	✓	✓				✓				
IES	LM-10-96	Photometric Testing of Outdoor Fluorescent Luminaires	Efficacy, Light Output, Zonal Lumen Distribution							✓			
IES	LM-20-13	Photometric Testing of Reflector – Type Lamps	Center Beam Intensity	✓		✓							
IES	LM-40-10	Life Testing of Fluorescent Lamps	Light Source Life, Lumen Maintenance							✓	✓		✓
IES	LM-41-14	Approved Method for Photometric Testing of Indoor Fluorescent Luminaires	Efficacy, Light Output, Zonal Lumen Distribution							✓			
IES	LM-58-13	Guide to Spectroradiometric Measurements	Color Angular Uniformity				✓						
IES	LM-65-14	Life Testing of Compact Fluorescent Lamps	Light Source Life, Lumen Maintenance			✓	✓			✓	✓		✓
IES	LM-66-14	Electrical and Photometric Measurements of Single-Ended Compact Fluorescent Lamps	Efficacy, Output, Lumen Maintenance, CCT, CRI			✓	✓			✓	✓		✓
IES	LM-79-08	Electrical and Photometric Measurements of Solid-State Lighting Products (Goniophotometer)	Zonal Lumen Distribution, Color Angular Uniformity, Luminaire Photometry	✓	✓			✓	✓				
IES	LM-82-12	Characterization of LED Light Engines and LED Lamps for Electrical and Photometric Properties as a Function of Temperature	Efficacy, Light Output, Lumen Maintenance, CCT, CRI, Color Maintenance, Light Source Life	✓		✓		✓					
IES	LM-84-14	Measuring Luminous Flux and Color Maintenance of LED Lamps, Light Engines, and Luminaires	Lumen Maintenance: Option 2	✓	✓			✓	✓				
IES	LM-9-09	Electric and Photometric Measurements of Fluorescent Lamps	Efficacy, Output, Lumen Maintenance, CCT, CRI							✓	✓		✓
US DOE	81 FR 59385	Energy Conservation Program: Test Procedure for Compact Fluorescent Lamps	Efficacy, Output, CCT, CRI, Power Factor, Start Time, Standby Power			✓	✓						
US DOE	81 FR 43403	Energy Conservation Program: Test Procedures for Integrated Light-Emitting Diode Lamps	Efficacy, Output, CCT, CRI, Color Maintenance, Lumen Maintenance, Power Factor, Standby Power	✓	✓								

While not required to be on a lab's scope of accreditation, reference documents are essential for understanding and applying the requirements for which they were referenced.

				Lamps				Luminaires							
Reference Document		Document Title	ENERGY STAR Specification Section	Notes	Solid-State		Compact Fluorescent		Solid-State			Fluorescent			
					Directional	Omnidirectional & Decorative	Directional	Omnidirectional & Decorative	Directional Luminaires	Non-directional Luminaires and Subcomponents	LED Packages, Arrays, and Modules	Directional Luminaires	Non-directional Luminaires	CSD - Ballasts	CSD - Lamps
ANSI	C78.20-2003	Electric Lamps—A, G, PS and Similar Shapes with E26 Medium Screw Bases	Lamp Shape			✓		✓							
ANSI	C78.21-2011	Incandescent Lamps—PAR and R Shapes	Lamp Shape		✓			✓							
ANSI	C78.23-1995 (R2003)	Incandescent Lamps—Miscellaneous Types	Lamp Shape			✓		✓							
ANSI	C78.376-2014	Specifications for the Chromaticity of Fluorescent Lamps	CCT			✓		✓		✓					
ANSI	C78.79-2014 and C78.50-2014	Electric Lamps – Nomenclature for Envelope Shapes Intended for Use with Electric Lamps and Electric Lamps – Assigned LED Lamp Codes	Lamp Shape		✓		✓	✓							
ANSI	C78.901-2014	Single-based Fluorescent Lamps - Dimensional and Electrical Characteristics	Light Source Shipment									✓		✓	
ANSI	C79.1-2002	Nomenclature for Glass Bulbs Intended for Use with Electric Lamps	Lamp Shape		✓		✓	✓							
ANSI	C82.11-2011	High-Frequency Fluorescent Lamp Ballasts	Source Start Time									✓		✓	
ANSI	C82.77-10-2014	Method of Measurement of Fluorescent Lamp Ballasts	Power Factor		✓		✓	✓		✓		✓		✓	
ANSI / ASA	S12.55-2012/ISO 3745:2012	Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Precision methods for anechoic rooms and hemi-anechoic rooms	Audible Noise		✓		✓	✓							
ANSI / ANSLG	C78.357-2010	For Incandescent Lamps: Tungsten Halogen Lamps (non-vehicle)	Lamp Shape		✓			✓							
ANSI / ANSLG	C78.377-2015	Specifications for the Chromaticity of Solid State Lighting Products	CCT		✓		✓								
ANSI / ANSLG	C81.61-2009	Specifications for Bases (Caps) for Electric Lamps	Light Source Shipment									✓		✓	
ANSI / ANSLG	C81.61-2009 (R2014)	Specifications for Bases (Caps) for Electric Lamps	Lamp Base		✓		✓	✓							
ANSI / ANSLG	C81.62-2009	Lampholders for Electric Lamps	Light Source Replaceability									✓		✓	
ANSI / IEEE	C62.41.1-2002	Guide on the Surge Environment in Low-Voltage (1000 V and Less) AC Power Circuits	Transient Protection						✓		✓		✓		✓
ANSI / IEEE	C62.41.2-2002	Recommended Practice on Characterization of Surges in Low-Voltage (1000V and Less) AC Power Circuits	Transient Protection		✓		✓	✓		✓			✓		✓
ANSI / NEMA / ANSLG	C78.377-2011	Specifications for the Chromaticity of Solid State Lighting Products	Correlated Color Temperature						✓		✓				
ANSI / UL	2108-2004	Standard for Low-Voltage Lighting Systems	Indoor Luminaire Safety, Electronic Ballast or Driver Safety						✓		✓				
ANSI / UL	1310-2010	Standard for Safety of Class 2 Power Units	Electronic Ballast or Driver Safety						✓		✓		✓		✓
ANSI / UL	153:2002	Standard for Safety of Portable Electric Luminaires	Color Rendering Index (CRI), Color Maintenance, Maximum Measured Ballast or Driver Case Temperature, Indoor Luminaire Safety										✓		✓
ANSI / UL	1574:2004	Standard for Safety of Track Lighting Systems	Color Rendering Index (CRI), Color Maintenance, Maximum Measured Ballast or Driver Case Temperature, Indoor Luminaire Safety										✓		✓
ANSI / UL	1598:2008	Standard for Safety of Luminaires	Color Rendering Index (CRI), Color Maintenance, Maximum Measured Ballast or Driver Case Temperature, Recessed Downlight Thermal Performance, Indoor Luminaire Safety										✓		✓

While not required to be on a lab's scope of accreditation, reference documents are essential for understanding and applying the requirements for which they were referenced.

were referenced.					Lamps				Luminaires						
Reference Document		Document Title	ENERGY STAR Specification Section	Notes	Solid-State		Compact Fluorescent		Solid-State			Fluorescent			
					Directional	Omnidirectional & Decorative	Directional	Omnidirectional & Decorative	Directional Luminaires	Non-directional Luminaires and Subcomponents	LED Packages, Arrays, and Modules	Directional Luminaires	Non-directional Luminaires	CSD - Ballasts	CSD - Lamps
ANSI / UL	1993-2009	Standard for Safety of Self-Ballasted Lamps and Lamp Adapters	Electronic Ballast or Driver Safety									✓	✓	✓	✓
ANSI / UL	1993-2012	Standard for Safety of Self-Ballasted Lamps and Lamp Adapters	Electrical Safety		✓	✓	✓	✓							
ANSI / UL	8750-2009	Standard for Light Emitting Diode (LED) Equipment for Use in Lighting Products	Indoor Luminaire Safety, Electronic Ballast or Driver Safety						✓	✓					
ANSI / UL	935-2009	Standard for Safety of Fluorescent-Lamp Ballasts	Electronic Ballast or Driver Safety									✓	✓	✓	✓
ASTM	E283-04	Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen	Recessed Downlight Thermal Performance						✓	✓	✓	✓	✓	✓	✓
ENERGY STAR	Lamp Center Beam Intensity Benchmark Tool	ENERGY STAR Lamp Center Beam Intensity Benchmark Tool	Minimum Center Beam Intensity – PAR, MR and MRX lamps		✓		✓								
ENERGY STAR	Luminous Intensity Distribution Calculator	ENERGY STAR Luminous Intensity Distribution Calculator	Luminous Intensity Distribution			✓		✓							
ENERGY STAR	TM-21 Calculator	ENERGY STAR TM-21 Calculator	Lumen Maintenance	The ENERGY STAR TM-21 Calculator shall be used to substantiate lumen maintenance life claims.	✓	✓			✓	✓					
IEC	60901 (2011)	Single-capped Fluorescent Lamps - Performance Specifications	Light Source Shipment		✓	✓	✓	✓							
IEC	62321:2008 (ed. 1)	Electrotechnical Products - Determination Of Levels Of Six Regulated Substances (lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, polybrominated diphenyl ethers)	Lighting Toxics		✓	✓	✓	✓							
IES	LM-54-12	Guide to Lamp Seasoning	Efficacy, Output, Center Beam Intensity, Luminous Intensity Distribution, Lumen Maintenance, Lifetime, CCT, CRI, Color Maintenance, Color Angular Uniformity				✓	✓							
IES	LM-80-08	Measuring Lumen Maintenance of LED Light Sources	Lumen Maintenance		✓	✓					✓				
IES	TM-21-11	Projecting Long Term Lumen Maintenance of LED Light Sources + Addendum B	Light Source Life, Lumen Maintenance	Accreditation to TM-21 is not required, but EPA does require that the ENERGY STAR TM-21 Calculator be used to substantiate lumen maintenance life claims.	✓	✓			✓	✓					
IES	TM-27-14	Standard Format for the Electronic Transfer of Spectral Data	CRI		✓	✓	✓	✓							
IES	TM-28-14	Projecting Long-Term Luminous Flux Maintenance of LED Lamps and Luminaires	Lumen Maintenance: Option 2		✓	✓				✓					
IES	TM-30-15	Evaluating Light Source Color Rendition	CRI		✓	✓	✓	✓							
ISO	7574-4:1985	Statistical Methods for Determining and Verifying Stated Noise Emission Values of Machinery and Equipment	Audible Noise		✓	✓	✓	✓	✓	✓					
NEMA	LSL 45-2009	Recommendations for Solid State Lighting Sub-Assembly Interfaces for Luminaires	Light Source Replaceability						✓	✓					
NEMA	SSL 7A-2013	Phase Cut Dimming for Solid State Lighting: Basic Compatibility	Dimming						✓	✓					
US DOE	10 CFR 430	Energy Conservation Program for Consumer Products	Efficacy, Lumen Maintenance, Rapid Cycle Stress Test, Lifetime	Questions regarding the CFRs should be directed to the US Department of Energy.				✓							
US DOE	10 CFR 429	Certification, Compliance, and Enforcement for Consumer Products and Commercial and Industrial Equipment	Efficacy, Lumen Maintenance, Lifetime	Questions regarding the CFRs should be directed to the US Department of Energy.				✓							