

# ENERGY STAR® Guide to EPA Laboratory Recognition by Lighting Category

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## 1 Introduction

### 1.1 Purpose of Document

This document, *ENERGY STAR Guide to EPA Laboratory Recognition by Lighting Category* (“guide”) was created for lighting laboratories, accreditation bodies (ABs), certification bodies (CBs), and manufacturers. Its purpose is to provide 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 qualification. This guide covers the process of applying for EPA recognition, categories of EPA recognition, testing, and references.

### 1.2 Related Resources

For current information on EPA’s recognition processes, product specifications, or other methods of measurement and standards referenced in this guide, please visit the ENERGY STAR website’s [Laboratory Resources](#) section.

Laboratories may apply for EPA recognition to test to one or more ENERGY STAR lighting product specifications. The latest version of this application is available in the ENERGY STAR website’s [Laboratory Resources](#) section.

EPA-recognized laboratories are listed by ENERGY STAR lighting product specification on the [ENERGY STAR website](#).

## 2 Laboratory Recognition Overview

### 2.1 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](#);
2. Complete and sign the [Application for Recognition of Laboratories](#); and
3. Submit the application with a scanned version of the laboratory’s scope of accreditation to

[certification@energystar.gov](mailto:certification@energystar.gov).

If a laboratory is planning to seek 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 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 website.

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](#).

## 2.2 Scope of Accreditation

The scope of accreditation is a list of methods of measurement for which the laboratory seeks to be recognized. [Directive 2011-2](#) 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.

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. For example, in the ENERGY STAR specification for Decorative Light Strings (DLS), the test method is listed in Annex A. Therefore, either the full title of the Decorative Light Strings specification or the title and reference to Annex A should appear in the Scope of Accreditation.

If your lab has previously been recognized for one or more product categories, please ensure your AB updates your 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.

## 2.3 Performance Testing Requirements

EPA recognizes lighting laboratories for photometric and electrical performance testing only. Safety

testing has different laboratory requirements per Occupational Safety and Health Administration (OSHA).

The ENERGY STAR lighting specifications state that electrical safety testing must be carried out by one of OSHA's nationally recognized testing laboratories (NRTL). OSHA NRTLs may perform In Situ Temperature Measurement Testing (ISTMT) for SSL products, and guidance for recognition of non-NRTL organizations for ISTMT is in process. A full listing of NRTLs can be found on the [OSHA website](#).

### 3 Categories of Recognition

EPA laboratory recognition falls into three basic categories:

- Section 3.1 of this guide describes recognition for testing luminaires (and subcomponents of luminaires)
- Section 3.2 describes recognition for testing lamps; and
- Section 3.3 describes recognition for testing decorative light strings.

Recognition for testing luminaires and lamps is further subdivided by subcategories based on the type of luminaire and light source used. The required methods of measurement for recognition are noted in these sections by subcategory.

#### 3.1 Laboratory Recognition for Luminaire Specifications

Recognition for luminaires has a wide range of subcategories, due to the different methods of measurement required to adequately test luminaires with differing technologies and applications. 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 manufacturers source components such as lamps and ballasts that meet the [Luminaires](#) specification performance requirements.

Luminaire manufacturers 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 manufacturers 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.

##### 3.1.1 Fluorescent Luminaires

Laboratories can be recognized for directional fluorescent luminaires, non-directional fluorescent luminaires, or both. The required methods of measurement are outlined in the ENERGY STAR specification by directional fluorescent luminaires and non-directional fluorescent luminaires. For clarification purposes, a description of each applicable fluorescent subcomponent methods of measurement is included. The laboratory must also be recognized for measurement of non-directional

fluorescent luminaires.

### 3.1.1.1 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 manufacturer’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 qualified 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 established.

The following methods of measurement must appear in a laboratory’s scope of accreditation in order for the laboratory to earn EPA recognition for Non-directional Fluorescent Luminaires:

**Table 1: Required Methods of Measurement for Non-directional Fluorescent Luminaires**

Requirement Category	Methods of Measurement and Reference Documents		
Source Run up Time (ms)	ANSI	C78.5-2003	Specifications for Performance of Self-ballasted Compact Fluorescent Lamps
Power Factor, Operating Frequency	ANSI	C82.2-2002	Method of Measurement of Fluorescent Lamp Ballasts
Color Rendering (CRI)	CIE	Pub. No. 13.3-1995	Method of Measuring and Specifying Color Rendering of Light Sources
CCT	CIE	Pub. No. 15:2004	Colorimetry <sup>1</sup>
Efficacy, Light Output, Lumen Maintenance, CCT, CRI	IES	LM-9-09	Electric and Photometric Measurements of Fluorescent Lamps
Light Source Life, Lumen Maintenance	IES	LM-40-10	Life Testing of Fluorescent Lamps
Light Source Life, Lumen Maintenance	IES	LM-65-10	Life Testing of Compact Fluorescent Lamps
Efficacy, Output, Lumen Maintenance, CCT, CRI	IES	LM-66-11	Electrical and Photometric Measurements of Single-Ended Compact Fluorescent Lamps

<sup>1</sup> Not a method of measurement but requires accreditation.

### 3.1.1.2 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.

The Specification Scope & Luminaire Classification section of the ENERGY STAR Luminaires specification defines directional luminaires. A directional luminaire must fall within one of the categories included in either the residential grade luminaires section or the commercial grade luminaires section. Note, there is some overlap in the categories, allowing for qualification under both grades. If the luminaire does not fall within the categories specifically stated in the Directional Boxes 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.

The following methods of measurement must appear in a laboratory's scope of accreditation in order for the laboratory to earn EPA recognition for Directional Fluorescent Luminaires:

**Table 2: Required Methods of Measurement for Directional Fluorescent Luminaires**

Requirement Category	Methods of Measurement and Reference Documents <sup>2</sup>		
Source Run-up time	ANSI	C78.5-2003	Specifications for Performance of Self-ballasted Compact Fluorescent Lamps
Power Factor, Operating Frequency	ANSI	C82.2-2002	Method of Measurement of Fluorescent Lamp Ballasts
Color Rendering	CIE	Pub. No. 13.3-1995	Method of Measuring and Specifying Color Rendering of Light Sources
CCT	CIE	Pub. No. 15:2004	Colorimetry <sup>3</sup>
Efficacy, Output, Lumen Maintenance, CCT, CRI	IES	LM-9-09	Electric and Photometric Measurements of Fluorescent Lamps
Light Source Life, Lumen Maintenance	IES	LM-40-10	Life Testing of Fluorescent Lamps
Light Source Life, Lumen Maintenance	IES	LM-65-10	Life Testing of Compact Fluorescent Lamps
Efficacy, Light Output, Lumen Maintenance, CCT, CRI	IES	LM-66-11	Electrical and Photometric Measurements of Single-Ended Compact Fluorescent Lamps.

<sup>2</sup> Of these tests, everything with the exception of "Light Source Life, Lumen Maintenance" and "PF, Operating Frequency" is considered luminaire-specific performance data, and the luminaire must be tested as a system, with lamp and ballast (as applicable). The "Light Source Life, Lumen Maintenance" and "PF, Operating Frequency" data can be obtained from the CSD if available, or through testing at an EPA-recognized laboratory.

<sup>3</sup> Not a method of measurement but requires accreditation.

Efficacy, Light Output, Zonal Lumen Distribution	IES	LM-10-13	Photometric Testing of Outdoor Fluorescent Luminaires
Efficacy, Light Output, Zonal Lumen Distribution	IES	LM 41-13	Approved Method for Photometric Testing of Indoor Fluorescent Luminaries

### 3.1.1.3 Fluorescent Subcomponents (Lamps and Ballasts)

Linear fluorescent and compact fluorescent lamps and ballasts for these lamps may be tested and certified for listing on the CSD. There is no separate recognition for subcomponents, but laboratories must be recognized for testing non-directional fluorescent luminaires in order to certify subcomponents for listing.

The following methods of measurement must appear in a laboratory’s scope of accreditation in order for the laboratory to earn EPA recognition for fluorescent subcomponents:

**Table 3: Required Methods of Measurement for Luminaires CSD - Fluorescent Ballasts**

Requirement Category	Methods of Measurement		
PF, Operating Frequency	ANSI	C82.2-2002	Method of Measurement of Fluorescent Lamp Ballasts

**Table 4: Required Methods of Measurement for Luminaires CSD - Fluorescent Lamps**

Requirement Category	Methods of Measurement and Reference Documents <sup>4</sup>		
Color Rendering	CIE	Pub. No. 13.3-1995	Method of Measuring and Specifying Color Rendering of Light Sources
CCT	CIE	Pub. No. 15:2004	Colorimetry <sup>5</sup>
Efficacy, Light Output, Lumen Maintenance, CCT, CRI	IES	LM-9-09	Electric and Photometric Measurements of Fluorescent Lamps
Light Source Life, Lumen Maintenance	IES	LM-40-10	Life Testing of Fluorescent Lamps
Light Source Life, Lumen Maintenance	IES	LM-65-10	Life Testing of Compact Fluorescent Lamps
Efficacy, Light Output, Lumen Maintenance, CCT, CRI	IES	LM-66-11	Electrical and Photometric Measurements of Single-Ended Compact Fluorescent Lamps.

<sup>4</sup> Lamps must be measured using the voltage, current, cathode heating, and frequency appropriate to the respective ANSI or IEC documents on a reference ballast.

<sup>5</sup> Not a method of measurement but requires accreditation.

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

### 3.1.2 High Intensity Discharge Luminaires

Laboratories can be recognized for directional high intensity discharge (HID) luminaires, non-directional HID Luminaires, or both. These required methods of measurement are outlined in the ENERGY STAR specification by non-directional HID luminaires and directional HID luminaires.

#### 3.1.2.1 High Intensity Discharge (Non-directional Luminaires)

Non-directional HID 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, the luminaire manufacturer’s testing burden is reduced, since the source has already been tested through the third-party certification system.

For example, a non-directional outdoor luminaire that uses a pin-based, externally ballasted tubular compact ceramic metal halide lamp as a light source can be qualified using pre-existing data. The light output and efficacy of the light source are 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 must be tested within the luminaire to ensure they operate within the appropriate temperature range, and a safety listing for the luminaire would need to be established.

The following methods of measurement must appear in a laboratory’s scope of accreditation in order for the laboratory to earn EPA recognition for Non-directional HID Luminaires:

**Table 5: Required Methods of Measurement for Non-Directional HID Luminaires**

Requirement Category	Methods of Measurement		
Operating Frequency	ANSI	C78.389-2004 (R2009)	High-Intensity Discharge (HID)—Methods of Measuring Characteristics
Power Factor, Lamp Current Crest Factor	ANSI	C82.6-2005	Ballasts for High Intensity Discharge (HID) Lamps - Methods of Measurement
CRI	CIE	Pub. No. 13.3-1995	Method of Measuring and Specifying Color Rendering of Light Sources
Light Source Life, Lumen Maintenance	IES	LM 47-12	Life Testing of High Intensity Discharge (HID) Lamps
Efficacy, Light Output, CCT, CRI	IES	LM-51-13	Electrical and Photometric Measurements of High Intensity Discharge Lamps

### 3.1.2.2 High Intensity Discharge (Directional Luminaires)

The Specification Scope & Luminaire Classification section of the ENERGY STAR Luminaires specification defines directional luminaires. A directional luminaire must fall within one of the categories included in either the residential grade luminaires section or the commercial grade luminaires section. Note, there is some overlap in the categories, allowing for qualification under both grades. If the luminaire does not fall within the categories specifically stated in the Directional Boxes in the Specification Scope & Luminaire Classification section, the luminaire is considered non-directional.

The following methods of measurement must appear in a laboratory’s scope of accreditation in order for the laboratory to earn EPA recognition for Directional HID Luminaires:

**Table 6: Required Methods of Measurement for Directional HID Luminaires**

Requirement Category	Methods of Measurement <sup>6</sup>		
Operating Frequency	ANSI	C78.389-2004 (R2009)	High-Intensity Discharge (HID)—Methods of Measuring Characteristics
Power Factor, Lamp Current Crest Factor	ANSI	C82.6-2005	Ballasts for High Intensity Discharge (HID) Lamps - Methods of Measurement
CRI	CIE	Pub. No. 13.3-1995	Method of Measuring and Specifying Color Rendering of Light Sources
Light Source Life, Lumen Maintenance	IES	LM 47-12	Life Testing of High Intensity Discharge (HID) Lamps
Efficacy, Light Output, CCT, CRI	IES	LM-51-13	Electrical and Photometric Measurements of High Intensity Discharge Lamps
Efficacy, Output, Zonal Lumen Distribution	IES	LM-31-13	Photometric Testing of Roadway Luminaires Using Incandescent Filament and High Intensity Discharge (HID) Lamps
Efficacy, Output, Zonal Lumen Distribution	IES	LM-46-04	Photometric Testing of Indoor Luminaires Using High Intensity Discharge or Incandescent Filament Lamps

### 3.1.2.3 High Intensity Discharge (Lamps and Ballasts)

High Intensity Discharge lamps and ballasts may be tested and certified for listing on the CSD.

The following methods of measurement must appear in a laboratory’s scope of accreditation in order for the laboratory to earn EPA recognition for HID subcomponents:

<sup>6</sup> Of these tests, everything with the exception of “Light Source Life, Lumen Maintenance” and “Power Factor, Operating Frequency” is considered luminaire-specific performance data, and the luminaire must be tested as a system, with lamp and ballast (as applicable). The “Light Source Life, Lumen Maintenance” and “Power Factor, Operating Frequency” data can be obtained from the CSD if available, or through testing at an EPA-recognized testing laboratory.

**Table 7: Required Methods of Measurement for Luminaires CSD - HID Ballasts**

Requirement Category	Methods of Measurement		
Operating Frequency	ANSI	C78.389-2004 (R2009)	High-Intensity Discharge (HID)—Methods of Measuring Characteristics
PF, Lamp Current Crest Factor	ANSI	C82.6-2005	Ballasts for High Intensity Discharge (HID) Lamps - Methods of Measurement

**Table 8: Required Methods of Measurement for Luminaires CSD - HID Lamps**

Requirement Category	Methods of Measurement		
CRI	CIE	Pub. No. 13.3-1995	Method of Measuring and Specifying Color Rendering of Light Sources
Light Source Life, Lumen Maintenance	IES	LM 47-12	Life Testing of High Intensity Discharge (HID) Lamps
Efficacy, Light Output, CCT, CRI	IES	LM-51-13	Electrical and Photometric Measurements of High Intensity Discharge Lamps

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

**3.1.3 Solid State (Non-directional Luminaires and Subcomponents)**

Non-directional solid state (SSL) luminaires are to be evaluated using source photometry, similar to non-directional fluorescent or high intensity discharge 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.

The following methods of measurement must appear in a laboratory’s scope of accreditation in order for the laboratory to earn EPA recognition for Non-directional SSL Luminaires:

**Table 9: Required Methods of Measurement for Non-directional SSL Luminaires and Subcomponents**

Requirement Category	Methods of Measurement and Reference Documents <sup>7</sup>		
Efficacy, Output, Lumen Maintenance, CCT, CRI, Color Maintenance	IES	LM-79-08	Electrical and Photometric Measurements of Solid-State Lighting Products (section 10 not required for non-directional or subcomponents)
Power Factor	ANSI	C82.77-2002	Harmonic Emission Limits—Related Power Quality Requirements for Lighting Equipment
CRI	CIE	Pub. No. 13.3-1995	Method of Measuring and Specifying Color Rendering of Light Sources
CCT	CIE	Pub. No. 15:2004	Colorimetry <sup>8</sup>
Efficacy, Light Output, Lumen Maintenance, CCT, CRI, Color Maintenance, Light Source Life	IES	LM-82-12	Characterization of LED Light Engines and LED Lamps for Electrical and Photometric Properties as a Function of Temperature

The following are notable reference documents but are not required to appear in a laboratory’s scope of accreditation.

**Table 10: Reference Documents for Non-Directional SSL Luminaires and Subcomponents**

Reference Category	Reference Document <sup>9</sup>		
<i>Light Source Life, Lumen Maintenance</i>	<i>IES</i>	<i>TM-21-11<sup>10</sup></i>	<i>Projecting Long Term Lumen Maintenance of LED Light Sources</i>

**3.1.3.1 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.

The Specification Scope & Luminaire Classification section of the ENERGY STAR Luminaires specification defines directional luminaires. A directional luminaire must fall within one of the categories included in either the residential grade luminaires section or the commercial grade luminaires section. Note, there is some overlap in the categories, allowing for qualification under both grades. If the luminaire does not fall within the categories specifically stated in the Directional Boxes in the Specification Scope &

<sup>7</sup> Solid State Luminaires that utilize light sources that are “inseparable” are to be qualified under the “Directional Solid State Luminaires” category.

<sup>8</sup> Not a method of measurement but requires accreditation.

<sup>9</sup> Reference documents are not required to be on a laboratory’s scope of accreditation.

<sup>10</sup> EPA will not require accreditation to TM-21, but does require that the [ENERGY STAR TM-21 Calculator](#) be used to substantiate lumen maintenance life claims.

Luminaire Classification section, the luminaire is considered non-directional. Inseparable solid state luminaires are an exception, and are always categorized as directional.

The following methods of measurement must appear in a laboratory’s scope of accreditation in order for the laboratory to earn EPA recognition for Non-directional SSL Luminaires:

**Table 11: Required Methods of Measurement for Directional Solid State Luminaires**

Requirement Category	Methods of Measurement		
Zonal Lumen Distribution, Color Angular Uniformity, Luminaire Photometry	IES	LM-79-08 sections 10 and 12	Electrical and Photometric Measurements of Solid-State Lighting Products (Goniophotometer)
Color Angular Uniformity	IES	LM-58-13	Guide to Spectroradiometric Measurements
CRI	CIE	Pub. No. 13.3-1995	Method of Measuring and Specifying Color Rendering of Light Sources
CCT	CIE	Pub. No. 15: 2004	Colorimetry <sup>11</sup>
Efficacy, Light Output, Lumen Maintenance, CCT, CRI, Color Maintenance	IES	LM-79-08	Electrical and Photometric Measurements of Solid-State Lighting Products

The following are notable reference documents but are not required to appear in a laboratory’s scope of accreditation.

**Table 12: Reference Documents for Directional Solid State Luminaires**

Reference Category	Reference Documents <sup>12</sup>		
Power Factor	ANSI	C82.77-2002	Harmonic Emission Limits—Related Power Quality Requirements for Lighting Equipment
Light Source Life, Lumen Maintenance	IES	TM-21-11 <sup>13</sup>	Projecting Long Term Lumen Maintenance of LED Light Sources

Directional solid state lighting luminaires can be qualified using one of two options under the Lumen Maintenance Requirements section, described in the ENERGY STAR Luminaires specification.

<sup>11</sup> Not a method of measurement but requires accreditation.

<sup>12</sup> Reference documents are not required to be on a laboratory’s scope of accreditation.

<sup>13</sup> EPA will not require accreditation to TM-21, but does require that the [ENERGY STAR TM-21 Calculator](#) be used to substantiate lumen maintenance life claims.

### 3.1.4 LED Package, Array or Module Lumen Maintenance Testing

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

**Table 13: Required Methods of Measurement for LED Packages, Arrays, and Modules**

Requirement Category	Methods of Measurement		
Light Source Life, Lumen Maintenance	IES	IES LM-80-08	Method for Measuring Lumen Maintenance of LED Light Sources

Specific guidance regarding the content and application of LM-80 test reports submitted in support of product qualification is available in section 3 of “ENERGY STAR Program Guidance Regarding LED Package, LED Array, and LED Module Lumen Maintenance Performance Data Supporting Qualification of Lighting Products,” available on the [ENERGY STAR website](#).

### 3.1.5 Halogen Luminaires

Laboratories can be recognized for testing of directional Halogen luminaires, non-directional Halogen Luminaires, or both.

#### 3.1.5.1 Halogen (Non-Directional Luminaires)

EPA currently qualifies luminaires utilizing halogen light sources for ENERGY STAR only in the category of outdoor luminaires.

The following methods of measurement must appear in a laboratory’s scope of accreditation in order for the laboratory to earn EPA recognition for Non-directional Outdoor Halogen Luminaires:

**Table 14: Required Methods of Measurement for Non-Directional Outdoor Halogen Luminaires**

Requirement Category	Methods of Measurement <sup>14</sup>		
Light Source Life Requirements	IES	LM-49-2001 And / Or LM-49-2011	Approved Method for Life Testing of Filament Lamps

#### 3.1.5.2 Halogen (Directional Luminaires)

EPA currently qualifies luminaires utilizing halogen light sources for ENERGY STAR only in the category of outdoor luminaires. EPA recognizes laboratories for testing halogen-based luminaires and subcomponents for the following methods of measurement:

The following methods of measurement must appear in a laboratory’s scope of accreditation in order for the laboratory to earn EPA recognition for Directional Outdoor Halogen Luminaires:

<sup>14</sup> The Photometric Performance Requirements section of the ENERGY STAR Luminaires specification details the performance requirements of the photo sensor and motion sensors.

Table 15: Required Methods of Measurement for Directional Outdoor Halogen Luminaires

Requirement Category	Methods of Measurement		
Light Source Life Requirements	IES	LM-49-2001	Approved Method for Life Testing of Filament Lamps
Zonal Lumen Distribution	IES	At least one of: LM-10-96 LM-31-91 LM-41-98 LM-46-04 LM-79-08: section 10	Photometric Testing of Outdoor Fluorescent Luminaires Photometric Testing of Roadway Luminaires Using Incandescent Filament and High Intensity Discharge (HID) Lamps Photometric Testing of Indoor Fluorescent Luminaires Photometric Testing of Indoor Luminaires Using High Intensity Discharge or Incandescent Filament Lamps Electrical and Photometric Measurements of Solid-State Lighting Products

## 3.2 Laboratory Recognition for Replacement Lamp Specifications

### 3.2.1 Lamps V1.0 (Compact Fluorescent Lamps – Directional)

The [ENERGY STAR Lamps V1.0 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.

The following methods of measurement must appear in a laboratory’s scope of accreditation in order for the laboratory to earn EPA recognition for Directional CFL lamps for the ENERGY STAR Lamps V1.0 Specification:

Table 16: Required Methods of Measurement for Lamps V1.0: CFL Directional Lamps

Requirement Category	Methods of Measurement and Reference Documents		
Efficacy, Output, Center Beam Intensity, Lumen Maintenance, Lifetime, CCT, CRI	IES	LM-66-11	Electrical and Photometric Measurements of Single-Ended Compact Fluorescent Lamps.
Lumen Maintenance, Lifetime, Rapid Cycle Stress Test	IES	LM-65-10	Life Testing of Compact Fluorescent Lamps
Transient Protection	ANSI	C62.41.2-2002	IEEE Recommended Practice on Characterization of Surges in Low Voltage (1000V and Less) AC Power Circuits
Power Factor	ANSI	C82.2-2002	Fluorescent Lamp Ballasts, Methods of Measurement of (includes supplements)
CCT	ANSI	C78.376-2001	Specifications for the Chromaticity of Fluorescent Lamps
CCT	CIE	Pub. No. 15:2004	Colorimetry <sup>15</sup>
CRI	CIE	Pub. No. 13.3-1995	Method of Measuring and Specifying Color Rendering of Light Sources
Minimum Center Beam Intensity – PAR and MR lamps	ENERGY STAR	<a href="#">ENERGY STAR Online CBCP Tool</a>	Tool for Calculating Minimum Center Beam Intensity
Lumen Maintenance, Lifetime	ENERGY STAR	<a href="#">Elevated Temperature Life Test</a>	ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Elevated Temperature Life Testing
ETLOR	ENERGY STAR	<a href="#">Elevated Temperature Light Output Ratio</a>	ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Elevated Temperature Light Output Ratio
Start Time	ENERGY STAR	<a href="#">Start Time Test</a>	ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Start Time
Run Up Time	ENERGY STAR	<a href="#">Run Up Time Test</a>	ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Run-up Time

The following are notable reference documents but are not required to appear in a laboratory’s scope of accreditation:

<sup>15</sup> Not a method of measurement but requires accreditation.

**Table 17: Reference Documents for Lamps V1.0: CFL Directional Lamps**

<i>Requirement Category</i>	<i>Reference Documents<sup>16</sup></i>		
<i>Efficacy, Output, Center Beam Intensity, Luminous Intensity Distribution, Lumen Maintenance, Lifetime, CCT, CRI, Color Maintenance, Color Angular Uniformity,</i>	<i>IES</i>	<i>LM-54-12</i>	<i>Guide to Lamp Seasoning</i>
<i>Safety</i>	<i>UL</i>	<i>1993-2012</i>	<i>Standard for Safety of Self-Ballasted Lamps and Lamp Adapters</i>
<i>Lamp Shape</i>	<i>ANSI</i>	<i>C78.357-2010</i>	<i>For Incandescent Lamps: Tungsten Halogen Lamps (non-vehicle)</i>
<i>Lamp Shape</i>	<i>ANSI</i>	<i>C79.1-2002</i>	<i>Nomenclature for Glass Bulbs Intended for Use with Electric Lamps</i>
<i>Intensity Distribution</i>	<i>IES</i>	<i>LM-20-13</i>	<i>Photometric Testing of Reflector-Type Lamps</i>
<i>Lighting Toxics</i>	<i>IEC</i>	<i>62321:2008 (ed. 1)</i>	<i>Electrotechnical Products - Determination Of Levels Of Six Regulated Substances</i>
<i>Lamp Shape</i>	<i>ANSI</i>	<i>C78.21-2011</i>	<i>Electric Lamps—PAR and R Shapes</i>
<i>Lamp Base</i>	<i>ANSI</i>	<i>C81.61-2009</i>	<i>Specifications for Bases (Caps) for Electric Lamps</i>

### **3.2.2 Lamps V1.0 (Compact Fluorescent Lamps – Omnidirectional and Decorative)**

The following methods of measurement must appear in a laboratory’s scope of accreditation in order for the laboratory to earn EPA recognition for Omnidirectional and Decorative CFL lamps for the ENERGY STAR Lamps V1.0 Specification:

<sup>16</sup> Reference documents are not required to be on a laboratory’s scope of accreditation.

Table 18: Required Methods of Measurement for Lamps V1.0: CFL Omnidirectional and Decorative Lamps

Requirement Category	Methods of Measurement		
Efficacy, Output, Center Beam Intensity, Lumen Maintenance, Lifetime, CCT, CRI	IES	LM-66-11	Electrical and Photometric Measurements of Single-Ended Compact Fluorescent Lamps.
Lumen Maintenance, Lifetime, Rapid Cycle Stress Test	IES	LM-65-10	Life Testing of Compact Fluorescent Lamps
Transient Protection	ANSI	C62.41.2-2002	IEEE Recommended Practice on Characterization of Surges in Low Voltage (1000V and Less) AC Power Circuits
CCT	ANSI	C78.376-2001	Specifications for the Chromaticity of Fluorescent Lamps
Power Factor	ANSI	C82.2-2002	Fluorescent Lamp Ballasts, Methods of Measurement of (includes supplements)
Efficacy, Lumen Maintenance, Lifetime	US DOE	10 CFR 429 <sup>17</sup>	Certification, Compliance, and Enforcement for Consumer Products and Commercial and Industrial Equipment
Efficacy, Lumen Maintenance, Rapid Cycle Stress Test, Lifetime	US DOE	10 CFR 430 Appendix W to Subpart B <sup>18</sup>	Energy Conservation Program for Consumer Products
CCT	CIE	Pub. No. 15:2004	Colorimetry <sup>19</sup>
CRI	CIE	Pub. No. 13.3-1995	Method of Measuring and Specifying Color Rendering of Light Sources
Lumen Maintenance, Lifetime	ENERGY STAR	<a href="#">Elevated Temperature Life Test</a>	ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Elevated Temperature Life Testing
Start Time	ENERGY STAR	<a href="#">Start Time Test</a>	ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Start Time
Run Up Time	ENERGY STAR	<a href="#">Run Up Time Test</a>	ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Run-up Time

The following are notable reference documents but are not required to appear in a laboratory's scope of accreditation:

<sup>17</sup> Accreditation limitations may apply, please contact the US Department of Energy

<sup>18</sup> Accreditation limitations may apply, please contact the US Department of Energy

<sup>19</sup> Not a method of measurement but requires accreditation.

**Table 19: Reference Documents for Lamps V1.0: CFL Omnidirectional and Decorative Lamps**

<i>Requirement Category</i>	<i>Reference Documents<sup>20</sup></i>		
<i>Efficacy, Output, Center Beam Intensity, Luminous Intensity Distribution, Lumen Maintenance, Lifetime, CCT, CRI, Color Maintenance, Color Angular Uniformity,</i>	<i>IES</i>	<i>LM-54-12</i>	<i>Guide to Lamp Seasoning</i>
<i>Safety</i>	<i>UL</i>	<i>1993-2012</i>	<i>Standard for Safety of Self-Ballasted Lamps and Lamp Adapters</i>
<i>Lighting Toxics</i>	<i>IEC</i>	<i>62321:2008 (ed. 1)</i>	<i>Electrotechnical Products - Determination Of Levels Of Six Regulated Substances</i>
<i>Lamp Shape</i>	<i>ANSI</i>	<i>C78.20-2003</i>	<i>Electric Lamps—A, G, PS and Similar Shapes with E26 Medium Screw Bases</i>
<i>Lamp Shape</i>	<i>ANSI</i>	<i>C78.23-1995 (R2003)</i>	<i>Incandescent Lamps—Miscellaneous Types</i>
<i>Lamp Shape</i>	<i>ANSI</i>	<i>C79.1-2002</i>	<i>Nomenclature for Glass Bulbs Intended for Use with Electric Lamps</i>
<i>Lamp Base</i>	<i>ANSI</i>	<i>C81.61-2009</i>	<i>Specifications for Bases (Caps) for Electric Lamps</i>

### **3.2.3 Lamps V1.0 (Solid State Lighting Lamps - Directional)**

All LED lamps require an intensity distribution from a goniophotometer for certification to the Lamps V1.0 specification. Directional LED lamps have requirements for the Lamps V1.0 specification that require a goniophotometer with a colorimeter or spectroradiometer in order to perform intensity and color angular uniformity tests.

The following methods of measurement must appear in a laboratory’s scope of accreditation in order for the laboratory to earn EPA recognition for Directional LED Lamps for the ENERGY STAR Lamps V1.0 Specification:

<sup>20</sup> Reference documents are not required to be on a laboratory’s scope of accreditation.

Table 20: Required Methods of Measurement for Lamps: LED Directional Lamps

Requirement Category	Methods of Measurement		
Efficacy, Output, Center Beam Intensity, Luminous Intensity Distribution, Lumen Maintenance, Lifetime, CCT, CRI, Color Maintenance, Color Angular Uniformity,	IES	LM-79-08	Electrical and Photometric Measurements of Solid-State Lighting Products
Power Factor	ANSI	C82.77-2002 Sections 6 and 7	Harmonic Emission Limits—Related Power Quality Requirements for Lighting Equipment
Transient Protection	ANSI	C62.41.2-2002	IEEE Recommended Practice on Characterization of Surges in Low Voltage (1000V and Less) AC Power Circuits
CCT	CIE	Pub. No. 15:2004	Colorimetry <sup>21</sup>
CCT	ANSI	C78.377-2011	Specifications for the Chromaticity of Solid State Lighting Products
CRI	CIE	Pub. No. 13.3-1995	Method of Measuring and Specifying Color Rendering of Light Sources
Minimum Center Beam Intensity – PAR and MR lamps	ENERGY STAR	<a href="#">ENERGY STAR Online CBCP Tool</a>	Tool for Calculating Minimum Center Beam Intensity
Lumen Maintenance, Lifetime	ENERGY STAR	<a href="#">Elevated Temperature Life Test</a>	ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Elevated Temperature Life Testing
Lumen Maintenance, Lifetime	ENERGY STAR	<a href="#">Ambient Temperature Life Test</a>	ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Ambient Temperature Life Testing
ETLOR	ENERGY STAR	<a href="#">Elevated Temperature Light Output Ratio</a>	ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Elevated Temperature Light Output Ratio
Start Time	ENERGY STAR	<a href="#">Start Time Test</a>	ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Start Time

The following are notable reference documents but are not required to appear in a laboratory’s scope of accreditation:

<sup>21</sup> Not a method of measurement but requires accreditation.

**Table 21: Referenced Documents for Lamps: LED Directional Lamps**

<i>Requirement Category</i>	<i>Reference Documents<sup>22</sup></i>		
<i>Safety</i>	<i>UL</i>	<i>8750-2009</i>	<i>Standard for Light Emitting Diode (LED) Equipment for Use in Lighting Products</i>
<i>Lumen Maintenance</i>	<i>IES</i>	<i>LM-80-08</i>	<i>Measuring Lumen Maintenance of LED Light Sources</i>
<i>Lumen Maintenance</i>	<i>IES</i>	<i>TM-21-11</i>	<i>Projecting Long Term Lumen Maintenance of LED Light Sources</i>
<i>Safety</i>	<i>UL</i>	<i>1993-2012</i>	<i>Standard for Safety of Self-Ballasted Lamps and Lamp Adapters</i>
<i>Lamp Shape</i>	<i>ANSI</i>	<i>C78.357-2010</i>	<i>For Incandescent Lamps: Tungsten Halogen Lamps (non-vehicle)</i>
<i>Lamp Shape</i>	<i>ANSI</i>	<i>C79.1-2002</i>	<i>Nomenclature for Glass Bulbs Intended for Use with Electric Lamps</i>
<i>Lighting Toxics</i>	<i>IEC</i>	<i>62321:2008 (ed. 1)</i>	<i>Electrotechnical Products - Determination Of Levels Of Six Regulated Substances</i>
<i>Intensity Distribution</i>	<i>IES</i>	<i>LM-20-13</i>	<i>Photometric Testing of Reflector-Type Lamps</i>
<i>Lamp Shape</i>	<i>ANSI</i>	<i>C78.21-2011</i>	<i>Electric Lamps—PAR and R Shapes</i>
<i>Lamp Base</i>	<i>ANSI</i>	<i>C81.61-2009</i>	<i>Specifications for Bases (Caps) for Electric Lamps</i>

### **3.2.4 Lamps V1.0 (Solid State Lighting Lamps – Omnidirectional and Decorative)**

All LED lamps require an intensity distribution from a goniophotometer for certification to the Lamps V1.0 specification.

The following methods of measurement must appear in a laboratory’s scope of accreditation in order for the laboratory to earn EPA recognition for omnidirectional and decorative LED Lamps for the ENERGY STAR Lamps V1.0 Specification:

<sup>22</sup> Reference documents are not required to be on a laboratory’s scope of accreditation.

Table 22: Required Methods of Measurement for Lamps V1.0: LED Omnidirectional and Decorative Lamps

Requirement Category	Methods of Measurement		
Efficacy, Output, Center Beam Intensity, Luminous Intensity Distribution, Lumen Maintenance, Lifetime, CCT, CRI, Color Maintenance, Color Angular Uniformity,	IES	LM-79-08	Electrical and Photometric Measurements of Solid-State Lighting Products
Power Factor	ANSI	C82.77-2002 Sections 6 and 7	Harmonic Emission Limits—Related Power Quality Requirements for Lighting Equipment
Transient Protection	ANSI	C62.41.2-2002	IEEE Recommended Practice on Characterization of Surges in Low Voltage (1000V and Less) AC Power Circuits
CCT	CIE	Pub. No. 15:2004	Colorimetry <sup>23</sup>
CRI	CIE	Pub. No. 13.3-1995	Method of Measuring and Specifying Color Rendering of Light Sources
Lumen Maintenance, Lifetime	ENERGY STAR	<a href="#">Elevated Temperature Life Test</a>	ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Elevated Temperature Life Testing
Lumen Maintenance, Lifetime	ENERGY STAR	<a href="#">Ambient Temperature Life Test</a>	ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Ambient Temperature Life Testing
Start Time	ENERGY STAR	<a href="#">Start Time Test</a>	ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Start Time

The following are notable reference documents but are not required to appear in a laboratory’s scope of accreditation:

<sup>23</sup> Not a method of measurement but requires accreditation.

**Table 23: Reference Documents for Lamps V1.0: LED Omnidirectional and Decorative Lamps**

<i>Requirement Category</i>	<i>Reference Documents<sup>24</sup></i>		
<i>CCT</i>	<i>ANSI</i>	<i>C78.377-2011</i>	<i>Specifications for the Chromaticity of Solid State Lighting Products</i>
<i>Safety</i>	<i>UL</i>	<i>8750-2009</i>	<i>Standard for Light Emitting Diode (LED) Equipment for Use in Lighting Products</i>
<i>Lumen Maintenance</i>	<i>IES</i>	<i>LM-80-08</i>	<i>Measuring Lumen Maintenance of LED Light Sources</i>
<i>Lumen Maintenance</i>	<i>IES</i>	<i>TM-21-11</i>	<i>Projecting Long Term Lumen Maintenance of LED Light Sources</i>
<i>Lighting Toxics</i>	<i>IEC</i>	<i>62321:2008 (ed. 1)</i>	<i>Electrotechnical Products - Determination Of Levels Of Six Regulated Substances</i>
<i>Safety</i>	<i>UL</i>	<i>1993-2012</i>	<i>Standard for Safety of Self-Ballasted Lamps and Lamp Adapters</i>
<i>CCT</i>	<i>ANSI</i>	<i>C78.376-2001</i>	<i>Specifications for the Chromaticity of Fluorescent Lamps</i>
<i>Lamp Shape</i>	<i>ANSI</i>	<i>C78.20-2003</i>	<i>Electric Lamps—A, G, PS and Similar Shapes with E26 Medium Screw Bases</i>
<i>Lamp Shape</i>	<i>ANSI</i>	<i>C78.23-1995 (R2003)</i>	<i>Incandescent Lamps—Miscellaneous Types</i>
<i>Lamp Shape</i>	<i>ANSI</i>	<i>C79.1-2002</i>	<i>Nomenclature for Glass Bulbs Intended for Use with Electric Lamps</i>
<i>Lamp Base</i>	<i>ANSI</i>	<i>C81.61-2009</i>	<i>Specifications for Bases (Caps) for Electric Lamps</i>

### **3.2.5 Compact Fluorescent Lamps V4.3 (Expires May 2014)**

The following methods of measurement must appear in a laboratory’s scope of accreditation in order for the laboratory to earn EPA recognition for CFLs eligible for certification to ENERGY STAR CFL V4.3:

<sup>24</sup> Reference documents are not required to be on a laboratory’s scope of accreditation.

**Table 24: Required Methods of Measurement for Compact Fluorescent Lamps V4.3**

Requirement Category	Methods of Measurement		
Efficacy, Output, Lumen Maintenance, CCT, CRI: Compact Fluorescent	IES	LM-66-00	Electrical and Photometric Measurements of Single-Ended Compact Fluorescent Lamps.
Efficacy, Output, Lumen Maintenance, CCT, CRI: Circle Design	IES	LM-9-99	Electrical and Photometric Measurements of Linear Fluorescent Lamps
Light Source Life: Compact Fluorescent	IES	LM-65-01	Life Testing of Compact Fluorescent Lamps
Light Source Life: Circle Design	IES	LM-40-01	Life Testing of Fluorescent Lamps
Lumen Maintenance	ANSI	C78.5-2003	Specifications for Performance of Self-ballasted Compact Fluorescent Lamps
Lumen Maintenance	n/a	CFL v4.3 Annex A <sup>25</sup>	ENERGY STAR Elevated Temperature Test Procedure (Annex A of CFL v4.3)
Color Rendering	CIE	Pub. No. 13.3-1995	Method of Measuring and Specifying Color Rendering of Light Sources
Source Run-up time	ANSI	C78.5-2003	Specifications for Performance of Self-ballasted Compact Fluorescent Lamps

### 3.2.6 Integral LED Lamps V1.4 (Omnidirectional/Directional) (Expires May 2014)

In the [ENERGY STAR Integral LED Lamps Specification](#) V1.4, LED lamp testing varies according to the form factor or likely use of the lamp being tested. This addresses appropriate measurement of the lamp and its intended usage.

The following methods of measurement must appear in a laboratory’s scope of accreditation in order for the laboratory to earn EPA recognition for Omnidirectional, Directional and Non-standard Integral LED Lamps eligible for certification to ENERGY STAR Integral LED Lamps V1.4:

<sup>25</sup> Applicable to indoor reflector CFLs only, and as an alternative to accreditation, a statement of compliance from the laboratory is currently being accepted for this requirement.

**Table 25: Required Methods of Measurement for Integral LED Lamps V1.4: Omnidirectional, Directional and Non-Standard Lamps**

Requirement Category	Methods of Measurement		
Efficacy, Output, Lumen Maintenance, <sup>26</sup> CCT, CRI, Luminous Intensity Distribution	IES	LM-79-08	Electrical and Photometric Measurements of Solid-State Lighting Products
CCT	CIE	Pub. No. 15:2004	Colorimetry <sup>27</sup>
Color Maintenance	IES	LM-79-08	Electrical and Photometric Measurements of Solid-State Lighting Products
Color Spatial Uniformity, Minimum Center Beam Intensity – PAR and MR lamps	IES	LM-79-08 Section 9, 10, and 12	Electrical and Photometric Measurements of Solid-State Lighting Products (Goniophotometer)
Lumen Maintenance	n/a	Integral LED Lamps v1.4 Appendix E <sup>28</sup>	ENERGY STAR Elevated Temperature Test Procedure (Appendix E of Integral LED Lamps v1.4)
Rapid Cycle Stress Tests	IES	LM-65-01 Clauses 2,3,5,6	Life Testing of Compact Fluorescent Lamps

The following are notable reference documents but are not required to appear in a laboratory’s scope of accreditation.

**Table 26: Reference Documents for Integral LED Lamps V1.4: Omnidirectional, Directional and Non-Standard Lamps**

Reference Category	Reference Documents <sup>29</sup>		
Rapid Cycle Stress Tests	ANSI	C78.5-2003	<i>Specifications for Performance of Self-ballasted Compact Fluorescent Lamps</i>
Color Rendering Index (CRI)	CIE	Pub. No. 13.3-1995	<i>Method of Measuring and Specifying Color Rendering of Light Sources</i>
Minimum Center Beam Intensity – PAR and MR lamps	n/a	<a href="#">ENERGY STAR Online CBCP Tool</a>	<i>Tool for Calculating Minimum Center Beam Intensity</i>
Lumen Maintenance	IES	LM-80-08	<i>Method for Measuring Lumen Maintenance of LED Light Sources</i>
PF, Operating Frequency	ANSI	C82.77-2002	<i>Standard for Harmonic Emission Limits – Related Power Quality Requirements for Lighting Equipment</i>

<sup>26</sup> Initial qualification using IES LM-80-08 and TMP verification is available at 3,000 hours of testing to improve speed to market, but the full 6,000 hours of testing must still be completed. The laboratory must notify its CB immediately if a lamp fails the 6,000 hour test.

<sup>27</sup> Not a method of measurement but requires accreditation.

<sup>28</sup> Applicable to LEDs with a power consumption greater than or equal to 10W, and as an alternative to accreditation, a statement of compliance from the laboratory is currently being accepted for this requirement.

<sup>29</sup> Reference documents are not required to be on a laboratory’s scope of accreditation.

### 3.2.7 Integral LED Lamps (Decorative) (Expires May 2014)

The following methods of measurement must appear in a laboratory's scope of accreditation in order for the laboratory to earn EPA recognition for Decorative Integral LED Lamps:

**Table 27: Required Methods of Measurement for Integral LED Lamps V 1.4: Decorative Lamps**

Requirement Category	Methods of Measurement		
Efficacy, Output, Lumen Maintenance, CCT, CRI	IES	LM-79-08 Sections 9 and 12	Electrical and Photometric Measurements of Solid-State Lighting Products
CCT	CIE	Pub. No. 15:2004	Colorimetry <sup>30</sup>
Color Maintenance	IES	LM-79-08	Electrical and Photometric Measurements of Solid-State Lighting Products
Lumen Maintenance	n/a	Integral LED Lamps v1.4 Appendix E <sup>31</sup>	ENERGY STAR Elevated Temperature Test Procedure (Appendix E of Integral LED Lamps v1.4)
Rapid Cycle Stress Tests	IES	LM-65-01 Clauses 2,3,5,6	Life Testing of Compact Fluorescent Lamps

The following are notable reference documents but are not required to appear in a laboratory's scope of accreditation.

**Table 28: Reference Documents for Integral LED Lamps V1.4: Decorative Lamps**

Reference Category	Reference Documents <sup>32</sup>		
Color Rendering Index (CRI)	CIE	Pub. No. 13.3-1995	Method of Measuring and Specifying Color Rendering of Light Sources
Rapid Cycle Stress Tests	ANSI	C78.5-2003	Specifications for Performance of Self-ballasted Compact Fluorescent Lamps
PF, Operating Frequency	ANSI	C82.77-2002	Standard for Harmonic Emission Limits – Related Power Quality Requirements for Lighting Equipment
Lumen Maintenance	IES	LM-80-08	Method for Measuring Lumen Maintenance of LED Light Sources

For lamp shapes noted that do not have an ANSI Maximum Outline in C79.1-2002, EPA has provided [guidance](#) to determine the maximum diameter tolerance from the nominal lamp designation size.

### 3.3 Laboratory Recognition for Decorative Light Strings Specification

[The ENERGY STAR Program Requirements for Decorative Light Strings Test Procedure and Eligibility Criteria v1.5](#), Appendix A, outlines the methods of measurement for decorative light strings (DLS).

<sup>30</sup> Not a method of measurement but requires accreditation.

<sup>31</sup> Applicable to LEDs with a power consumption greater than or equal to 10W, and as an alternative to accreditation, a statement of compliance from the laboratory is currently being accepted for this requirement.

<sup>32</sup> Reference documents are not required to be on a laboratory's scope of accreditation.

The “ENERGY STAR Program Requirements for Decorative Light Strings” must appear in a laboratory’s scope of accreditation in order for the laboratory to earn EPA recognition for decorative light strings.

## 4 Expiring / Expired Specifications

EPA has completed the lighting specification integration plan, combining four separate lighting specifications into two, one for light fixtures, and one for light bulbs. The previous ENERGY STAR specifications have been replaced by new specifications that are similar in scope, however they remain open pathways for certification until May 30, 2014.

- ENERGY STAR Lamps Specification V1.0 is now final and an open pathway for certification. Lamps V1.0 will replace all lamp specification as of September 30, 2014. Certification to the new specification is highly encouraged and preferred.

### 4.1 Integral LED Lamps V1.4 and Compact Fluorescent Lamps V4.3

- Certification to Integral LED Lamps v1.4 or Compact Fluorescent Lamps V4.3 Specifications should cease by May 30, 2014.
- Currently qualified products will remain listed until the Lamps specification comes into effect on September 30, 2014.

## 5 5 Appendix

### 5.1 Appendix A: Other Referenced Standards and Documents

#### 5.1.1 American National Standards Institute (ANSI) or American National Standards Institute / American National Standard Lighting Group (ANSI/ANSLG) or American National Standards Institute / International Electrotechnical Commission (ANSI/IEC)

- C78.20-2003 - American National Standard for Electric Lamps - A, G, PS and Similar Shapes with E26 Medium Screw Bases
- C78.21-2011 - American National Standard for Incandescent Lamps - PAR and R Shapes
- C78.23-1995 - American National Standard for Incandescent Lamps - Miscellaneous Types
- C78.357-2010 - American National Standard for Incandescent Lamps – Tungsten Halogen Lamps (non-vehicle)
- C78.376-2001 - American National Standard for Specifications for the Chromaticity of Fluorescent Lamps
- C78.377-2008 - American National Standard for Electric Lamps—Specifications for the Chromaticity of Solid State Lighting (SSL) Products
- C78.377-2011 - American National Standard for Electric Lamps - Specifications for the Chromaticity of Solid State Lighting (SSL) Products
- C78.42-2009 - American National Standard for Electric Lamps—High-Pressure Sodium (HPS) Lamps

- C78.43-2007 - American National Standard for Electric Lamps—Single-Ended Metal Halide Lamps
- C78.81-2010 - American National Standard for Electric Lamps—Double-Capped Fluorescent Lamps—Dimensional and Electrical Characteristics
- C78.901-2005 - American National Standard for Electric Lamps—Single-Based Fluorescent Lamps—Dimensional and Electrical Characteristics
- C79.1-2002 -American National Standard for Nomenclature for Glass Bulbs Intended for Use with Electric Lamps
- C81.61-2009 - American National Standard for Electrical Lamp Bases—Specifications for Bases (Caps) for Electric Lamps
- C81.62-2009 - American National Standard for Electric Lampholders
- C82.11 Consolidated 2002 - American National Standard for Lamp Ballasts—High Frequency Fluorescent Lamp Ballasts
- C82.14-2006 - American National Standard for Lamp Ballasts—Low-Frequency Square Wave Electronic Ballasts—for Metal Halide Lamps
- C82.4-2002 - American National Standard for Lamp Ballasts—Ballasts for High-Intensity Discharge and Low-Pressure Sodium (LPS) Lamps (Multiple-Supply Type)

#### **5.1.2 American Society for Testing and Materials (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

#### **5.1.3 Canadian Standards Association (CAN/CSA)**

- C22.2 No. 74-96 (R2010) – Equipment for Use with Electric Discharge Lamps - Fourth Edition - Must be accredited by the Standards Council of Canada

#### **5.1.4 ENERGY STAR**

- ENERGY STAR Program Requirements for Integral LED Lamps V1.4
- ENERGY STAR Program Requirements for Compact Fluorescent Lamps (CFLs) V4.3
- ENERGY STAR Program Requirements for Luminaires V1.2
- ENERGY STAR Program Requirements for Decorative Light Strings Test Procedure and Eligibility Criteria V1.5
- Application for Recognition of Laboratories
- Directive #2011-01 Appropriate Marketing of ENERGY STAR Services by EPA-Recognized Bodies
- Directive #2011-02 EPA Policy on Laboratory Scopes of Accreditation for the ENERGY STAR Program
- Directive #2011-03 Proficiency Testing and Inter-Laboratory Comparison Testing Requirements for Lighting Laboratories
- Directive #2011-05 Measured versus Reported Values for ENERGY STAR Certification
- Directive #2011-06 ENERGY STAR Verification Testing Supplement: Selecting Products, Obtaining Products, and Reporting Results
- Directive #2012-01 ENERGY STAR Luminaires Verification Testing Guidance for Certification

#### Bodies – Test Requirements, Sample Sizes, and Determining Testing Failures

- Directive #2013-01 ENERGY STAR Luminaires That Do Not Ship with Lamps Verification Testing Guidance for Certification Bodies – Test Requirements
- Directive #2013-02 (or too soon?)
- Conditions and Criteria for Recognition of Certification Bodies for the ENERGY STAR Program
- Conditions and Criteria for Recognition of Laboratories for the ENERGY STAR Program

#### **5.1.5 International Organization for Standardization / International Electrotechnical Commission (ISO / IEC)**

- 17025:2005 - General requirements for the competence of testing and calibration laboratories
- 600611 - Lamp caps and holders together with gauges for the control of interchangeability and safety.
- 60081 Amendment 4 Edition 5.0 - Amendment 4 - Double-capped fluorescent lamps - Performance specifications
- 61347-2-3-am2 Ed 1.0 b.2006 - Particular Requirements for A.C. Supplied Electronic Ballasts for Fluorescent Lamps
- 62321 Ed. 1.0 - Electrotechnical products - Determination of levels of six regulated substances (lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, polybrominated diphenyl ethers)

#### **5.1.6 National Electrical Manufacturers Association (NEMA)**

- LSD 45-2009 - Recommendations for Solid State Lighting Sub-Assembly Interfaces for Luminaires
- LL 9-2009 - Dimming of T8 Fluorescent Lighting Systems

#### **5.1.7 Underwriter's Laboratory and Institute of Electrical and Electronics Engineers (UL & IEEE) Electrical Safety Tests**

- ANSI/IEEE C62.41-2002 (Transient Protection) - Guide on the Surge Environment in Low-Voltage (1,000 V and less) AC Power Circuits
- UL 153-2002 - Portable Electric Luminaires
- UL 935-2009 - Fluorescent-Lamp Ballasts
- UL 1029-2010 - High-Intensity-Discharge Lamp Ballasts
- UL 1310-2010 - Class 2 Power Units
- UL 1574-2004 - Track Lighting Systems
- UL 1598-2008 - Luminaires
- UL 1598B-2010 - Supplemental Requirements for Luminaire Reflector Kits for Installation on Previously Installed Fluorescent Luminaires
- UL 1993-2009 - Self-Ballasted Lamps and Lamp Adapters
- UL 2108-2004<sup>33</sup> - Low Voltage Lighting Systems
- UL 8750-2009<sup>12</sup> - Light Emitting Diode (LED) Light Sources For Use In Lighting Products\*

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<sup>33</sup> Until OSHA adds these tests to its offerings, a test report from an OSHA NRTL without UL2108-2004 or UL 8750-2009 on its scope of accreditation will be acceptable.