



# ENERGY STAR<sup>®</sup> Program Requirements for Residential Light Fixtures

## Eligibility Criteria – Version 4.1

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# ENERGY STAR® Program Requirements for Residential Light Fixtures

## Eligibility Criteria – Version 4.1

Below is the product specification (Version 4.1) for ENERGY STAR qualified residential light fixtures. A product must meet all of the identified criteria if it is to be labeled as ENERGY STAR by its manufacturer.

The intent of ENERGY STAR for Residential Light Fixtures is to move consumers from traditional incandescent fixtures to fixtures that use high-quality fluorescent or other energy-efficient technologies, including motion-sensors and daylight-sensors for outdoor fixtures.

- 1) Definitions: Below is a brief definition of a light fixture and other related terms as relevant to ENERGY STAR:
  - A. ALA: American Lighting Association.
  - B. ANSI: American National Standards Institute.
  - C. APLAC: Asia Pacific Laboratory Accreditation Cooperation (NVLAP MRA Signatory).
  - D. Automatic Daylight Shutoff: A photocell device that automatically prevents operation of a fixture during daylight hours.
  - E. Ballast: A device used with an electric-discharge lamp to obtain the necessary circuit conditions (voltage, current, and waveform) for starting and operating.
  - F. Ballast Frequency: The frequency at which the ballast operates the lamp, measured in Hertz (Hz) or Kilohertz (kHz).
  - G. CIE: Commission Internationale de l'Eclairage.
  - H. Color Rendering: The effect that the spectral characteristics of the light emitted by the lamp has on the color appearance of the objects illuminated by the lamp. Color Rendering Index is measured on a scale of zero to 100, and is defined in terms of a comparison of the spectral tri-stimulus values of the objects under test illumination and a reference or standard illumination according to the recommendations of CIE Publication No. 13.3.
  - I. Compact Fluorescent Lamp: A single based fluorescent lamp with a plug-in lamp base, including multi-tube, multibend, spiral, and circline types.
  - J. Correlated Color Temperature (CCT): The actual color of the lamp is called the color temperature and is defined in terms of the spectral tri-stimulus values (color coordinates) according to the recommendations of IESNA LM-16. For color coordinates near the Black Body loci, the correlated color temperature, measured in Kelvin (K), is used.
  - K. Covered Lamp: A lamp with an integral ballast and a translucent cover over the bare fluorescent glass tube.
  - L. Electronic Ballast: A ballast which uses semi-conductor components to increase the frequency of fluorescent lamp operation. Fluorescent system efficiency is increased due to the higher frequency.
  - M. GU-24 Based Integrated Lamp: A lamp unit that integrates all the elements necessary for starting and operating the lamp, does not include any replaceable or interchangeable parts, and utilizes the GU-24 base type.
  - N. IEC: International Electrotechnical Commission.

- O. IESNA: Illuminating Engineering Society of North America.
- P. ILAC: International Laboratory Accreditation Cooperation (NVLAP MRA Signatory).
- Q. Input Power: The actual total power used by all lamp(s) and ballast(s) of the light fixture during operation, as measured in watts (W).
- R. Lamp: A generic term for a manufactured source of light. By extension, the term is also used to denote sources that radiate in the visible spectrum.
- S. Lamp Ballast Platform: A pairing of one ballast with one or more lamps that can operate simultaneously on that ballast. A unique platform is defined by the manufacturer and model number of the ballast and lamp(s) and the quantity of lamps that operate on the ballast.
- T. Lamp Current Crest Factor: For 60Hz operation, the ratio of peak lamp current to the root mean square (RMS) lamp current. For high-frequency (HF) operation, the highest peak lamp current of the modulation envelope (when evaluated over a full line voltage cycle) to the root mean square (RMS) of the lamp current.
- U. Lampholder: A component of a fixture, which supplies power to the lamp and also holds the lamp in place.
- V. Light Fixture (Luminaire): A complete lighting unit consisting of a lamp or lamps and ballasting (when applicable) together with the parts designed to distribute the light, position and protect the lamps, and connect the lamps to the power supply.
- W. Linear Fluorescent Lamp: A double based fluorescent lamp with a plug-in lamp base, including straight shaped or U-bent types.
- X. Magnetic Ballast: A ballast which uses a magnetic core and copper winding and operates at the frequency of the line voltage.
- Y. MRA: Mutual Recognition Arrangement.
- Z. NACLA: National Cooperation for Laboratory Accreditation (NVLAP MRA Signatory).
- AA. NEMA: National Electrical Manufacturers Association.
- BB. NFPA: The National Fire Protection Association (United States), which develops the National Electrical Code (NEC).
- CC. NRTL: Nationally Recognized Testing Laboratory as recognized by OSHA's NRTL Program, which is a part of OSHA's Directorate of Technical Support.
- DD. NVLAP: National Voluntary Laboratory Accreditation Program.
- EE. Optics: Include reflectors, baffles, lenses and/or diffusers, all which control the light distribution and the appearance of the lighted fixture.
- FF. OSHA: Occupational Safety & Health Administration.
- GG. Pigtail: A short piece of cable with two connectors on each end for converting between one connector type and another; also referred to as a screw-based adapter and socket adapter.
- HH. Power Factor: The active power divided by the apparent power (i.e., the product of the rms input voltage and rms input current of a ballast).
- II. Recessed downlight retrofit kit: A non-linear lighting unit consisting of lamp(s), ballasting, optics, trim, and power supply connection designed to convert an incandescent or halogen type Insulated Ceiling (IC) or non-IC recessed downlight into an air-tight fixture that uses an energy-efficient light source.
- JJ. Run-up Time: The time needed after switching on the supply for the lamp to reach 80.0% of its stabilized luminous flux.
- KK. Standardized Color Ellipse: An elliptical region of chromaticity coordinates that is defined using a centroid, a tilt angle relative to a horizontal axis, and a defined level of variance. Such a region defines what chromaticity coordinates can be acceptably associated with a target Correlated Color

Temperature. For this specification, standardized color ellipses are defined using centroids based upon objective chromaticities (x,y) and tilt angles ( $\epsilon$ ) specified in Table 1 and 2 of ANSI C78.376-2001, and a defined variance of seven steps.

LL. Trim: Trim is the part of the downlight that covers the ragged edge of the ceiling cut-out. The trim may be a separate ring, or trim ring, or it may be integrated with the optics (i.e., a self-flanged reflector). Airtight or non-airtight.

MM. UL: Underwriters Laboratories.

**Note:** definitions for Covered Lamp, GU-24 Based Integrated Lamp, and Run-up Time were added because of the addition of requirements for GU-24 based platforms.

- 2) Qualifying Products: The ENERGY STAR Residential Light Fixture specification covers the requirements for indoor and outdoor light fixtures and recessed downlight retrofit kits intended primarily for residential type applications. For the purposes of this ENERGY STAR specification, residential applications include single-family and multi-family dwellings (such as houses and apartments), dormitories, public or military housing, assisted-living facilities, motels and hotels, and some light commercial applications.

**Exclusion of magnetic ballasts:** Indoor fixtures that use magnetic ballasts cannot be ENERGY STAR qualified under this Version 4.1 specification. Only outdoor fixtures that use high intensity discharge (HID) lamps, such as metal halide and high pressure sodium, may continue to use magnetic ballasts.

**Allowance of pin-based line voltage sockets and ballast/lamps in fixtures:** The line-voltage socket must comply with the standard GU-24 design developed by EPA and industry. Specific technical details for this standard design are located at:

<http://www.lrc.rpi.edu/programs/lightingTransformation/lineVoltage/index.asp>

**Temporary allowance for decorative LEDs:** EPA encourages the use of innovative light source technologies such as LEDs. LEDs used as decorative lighting elements in residential lighting fixtures and ceiling fan light kits are allowed as long as the total wattage of the LEDs does not exceed five (5) watts, the average LED system (LED and driver) efficacy is at least 20 lumens per watt, and the LED is used to supplement a primary light source that meets all of the applicable performance characteristics outlined in the Eligibility Criteria. The ENERGY STAR Partner must supply the following LED information to EPA: total wattage consumed by all the LEDs, manufacturer warranty, an LED manufacturer specification sheet that shows wattage, efficacy, LED life, color, and lumen depreciation. This is a temporary allowance for the use of LEDs; EPA plans to develop more comprehensive specifications for LED performance as the technology advances and becomes more widely used in residential applications.

- 3) Energy-Efficiency Specifications for Qualifying Products: Only those products listed in Section 2 that meet the criteria provided in Annex A may qualify as ENERGY STAR. Specifications for qualifying **indoor fixtures** can be found in Table 1. Specifications for qualifying **recessed downlight retrofit kits** can be found in Table 1A. Specifications for qualifying **outdoor fixtures** can be found in either Table 2A – Outdoor Fixtures: Compliance Through Efficient Light Source, or Table 2B – Outdoor Fixtures: Compliance Through Reduced Operating Time. Specifications for **GU-24 based integrated lamps** used in ENERGY STAR fixtures can be found in Table 3.

**Note:** Tables 1, 1A, 2A, and 2B are now located in Annex A of this specification. It is EPA's intention that this location will provide clarity and improve its ease of use for manufacturers. "Reference Standards and Required Documentation," have been incorporated into Tables 1, 1A, 2A, and 2B for further clarity.

**Note:** Table 3 includes new additions to this revised specification and provides eligibility criteria specific to GU-24 based integrated lamps to be used in ENERGY STAR qualified residential light fixtures, which have not previously been addressed by ENERGY STAR. A draft of criteria in Table 3 was distributed by EPA to industry stakeholders on May 16, 2006. Information about the revision process is available on the Web at [www.energystar.gov/productdevelopment](http://www.energystar.gov/productdevelopment).

4) Qualification Process, Acceptable Sources of Documentation, Reference Standards & Required Documentation<sup>1</sup>:

The following section describes the steps required to qualify residential light fixtures as ENERGY STAR, provides information about acceptable sources of documentation, and states the testing standards and documentation required for each performance characteristic.

Qualification Process:

To qualify a residential lighting fixture as ENERGY STAR, it must be tested according to the protocol outlined below. **Note: EPA reserves the right to require additional documentation, at any time, in order to determine compliance with all performance characteristics.**

A. Partner must test qualifying products and obtain required documentation to meet the performance characteristics referenced in Section 3 of this specification. Refer to the appropriate columns in Tables 1 through 3 to determine the reference standard and required documentation applicable to each performance characteristic.

The following stipulations apply:

- For multiple fixture models that use the same lamp/ballast combination, only one set of test results is required. For example, two fixtures that use the same lamp and ballast combination, but have different trim, lens and/or chase need only be tested once.
  - For fixture models that may use different ballasts (either in terms of the type of ballast or manufacturer), each lamp/ballast combination must undergo testing and the test results must be submitted for qualification. For example, if a residential light fixture partner plans to use ballasts from several manufacturers in any one fixture, the fixture must be tested with each manufacturer's ballast.
  - For fixture models with one ballast type that can work with multiple lamp types, the fixtures need only be tested with one lamp type. The lamp type must either be the one supplied with the fixture at shipment or, if a lamp is not supplied, one of the lamp types listed on the packaging. Please note that EPA expects all lamps listed on the packaging to comply with the specification when operating on the fixture's ballast. To ease the burden on the manufacturer, however, test data need be submitted for only one lamp type operating on the fixture's ballast.
- B. Electronically submit a completed copy of the ENERGY STAR Residential Light Fixture Qualified Product Information (QPI) form, along with required documentation in the Supplemental Information Reporting (SIR) form, to the address listed on the QPI form. To obtain the current version of the QPI and SIR forms, visit the "Lighting" section of the ENERGY STAR Web site at [www.energystar.gov/partners](http://www.energystar.gov/partners) and click on "Product Specifications."

Acceptable Sources of Documentation:

A. A variety of acceptable sources of documentation are referenced for each performance characteristic within Tables 1 through 3. For clarity, these sources are summarized below:

- **A test report from a laboratory accredited by NVLAP or one of its MRA signatories** – Both public and private accredited laboratories may be used. NVLAP's MRA signatory partners include ILAC, APLAC, and NACLA. Note that if the laboratory used for the lumen output, CRI, CCT, or lamp life test is accredited by NVLAP or one of its MRA signatories, it must also have a scope of accreditation that includes the method of measurement reference standard for this

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<sup>1</sup> EPA may on occasion modify submittal procedures and format. Partners will be notified at the time of these modifications. For the most current instructions on submitting fixtures to ENERGY STAR, reference the Residential Light Fixtures Partner Resources page on the ENERGY STAR website.

performance characteristic. Partners should obtain from the laboratory both its certificate of accreditation and its scope of accreditation and submit them to ENERGY STAR.

- **An EPA-approved Platform Letter of Qualification** – These letters are provided from EPA to manufacturers who have pre-approved specific performance characteristics for their lamp and/or ballast. When using this type of documentation, Partners should obtain a copy of the applicable letter from the manufacturer and include it with the ENERGY STAR submittal.
- **EPA-approved documentation from an industry association** – In certain instances, EPA has approved documentation from industry associations who take responsibility for specific performance characteristics of lamps and/or ballasts. When using this type of documentation, Partners should contact the industry association to obtain the EPA-approved documentation that is required for use with ENERGY STAR submittals. **Note:** Partners may use the NEMA-ALA Lamp and Ballast Matrices as a source for obtaining required information to qualify fixtures. These matrices can be found at <http://www.nema.org/lampballastmatrix/>.
- **A test report from an OSHA NRTL laboratory** – Documentation for safety requirements must come from an OSHA NRTL laboratory. OSHA NRTL laboratories may also be used to obtain certain additional performance characteristics, as specified in Tables 1 through 3.
- **Manufacturer documentation** – Documentation for certain performance characteristics (such as product packaging requirements) may come directly from the original equipment manufacturer.

B. The information below may be used to locate an accredited testing facility:

- For a list of NVLAP accredited laboratories, visit the NVLAP Web site at <http://www.nist.gov/nvlap> or call (301) 975-4016.
- For a list of signatories to the ILAC MRA, visit the ILAC Web site at [www.ilac.org](http://www.ilac.org).
- For a list of signatories to the APLAC MRA, visit the APLAC Web site at <http://www.ianz.govt.nz/aplac/>.
- For a list of signatories to the NACLA MRA, visit the NACLA Web site at [www.nacla.net](http://www.nacla.net).
- For a list of accredited OSHA NRTL laboratories, visit <http://www.osha.gov/dts/otpca/nrtl/> or call (202) 693-2110.

**Note:** As mentioned in the note for section 3, above, the former Table 3 provided in Version 4.0 has been incorporated into Tables 1 through 2B, which are provided in Annex A of this revised specification.

- 5) **Additional Quality Assurance Requirements:** The following requirements outline a manufacturer-financed quality assurance system that will allow for independent evaluation of ENERGY STAR qualified fixtures. These requirements went into effect with the Version 4.0 effective date of October 1, 2005. EPA may request manufacturers to submit products for quality assurance testing as described below. EPA reserves the right to modify these procedures based on experience gained in their implementation. The Procedures Manual for the first round of this program is available on the ENERGY STAR RLF Partner Resources page at: [http://www.energystar.gov/ia/partners/manuf\\_res/downloads/Final\\_QA4\\_Testing\\_Guidelines\\_Procedures\\_Man.pdf](http://www.energystar.gov/ia/partners/manuf_res/downloads/Final_QA4_Testing_Guidelines_Procedures_Man.pdf).

For the most current information on this program, reference the Residential Light Fixtures Partner Resources page on the ENERGY STAR website.

**Note:** On November 9, 2006 EPA distributed a letter to Partners and stakeholders indicating plans to expand the Quality Assurance Testing Program (QA4) to include lamp/ballast platforms and requested comments. EPA received feedback from several Partners and stakeholders and based on those comments has integrated QA4 for platforms with a sample size of ten; fixture sample size remains at three. Because of the larger impact of one platform on potentially hundreds of fixture models, EPA agrees that a larger sample of platforms should be tested. However, EPA also recognizes that requiring ten fixture samples would be very costly and thus has not changed QA4 fixture sample size. EPA is currently revising the QA4 Procedure Manual to include platforms.

The QA4 information written in this section is only intended to provide a general description and summary of the QA4 program and process. EPA's *ENERGY STAR Quality Assurance Testing Guidelines and Procedures Manual* provides details on the procedures manufactures and laboratories must follow to comply with QA4. The Procedures Manual can be found at, [http://www.energystar.gov/ia/partners/manuf\\_res/downloads/Final\\_QA4\\_Testing\\_Guidelines\\_Procedures\\_Man.pdf](http://www.energystar.gov/ia/partners/manuf_res/downloads/Final_QA4_Testing_Guidelines_Procedures_Man.pdf) or upon email request to [RLF@icfi.com](mailto:RLF@icfi.com).

- A. **Quality Assurance Testing (QA4):** EPA will select fixtures and platforms each year for quality assurance testing. The manufacturer of each selected fixture or platform will be required to commission third-party testing of the specified fixture by a manufacturer-independent NVLAP accredited testing lab. The testing lab will procure three (3) samples of each fixture and ten (10) samples of each platform on the open market (if possible). Specific testing details are outlined in the Procedures Manual. Each fixture and platform must be tested for:

Performance Parameters

- Efficacy
- Lamp Start Time
- Correlated Color Temperature
- Color Rendering Index
- Lamp Base Type
- Lumen Maintenance
- Maximum Ballast Operating Case Temperature (fixtures only)

Consumer Informational Parameters

- Product Packaging
- Lamp labeling information as written on the lamp or lamp base (manufacturer designation that encompasses the lamp manufacturer name, wattage, correlated color temperature, and color rendering index)

Schedule Requirements:

The manufacturer must retain a qualified third-party NVLAP accredited testing lab within 10 business days of EPA notification. The laboratory must complete all initial testing (except lumen maintenance, which should be started but cannot be completed) within 19 calendar days of notification of test start date to EPA. Testing on the first sample must be completed within 270 days of initial notification by EPA. If the second and third samples need to be tested, testing needs to be completed within 240 days of failure of the first sample.

For fixtures, if two or three samples fail to meet the same performance parameter of the ENERGY STAR specification, the fixture will be addressed under EPA's delisting protocol.

**Note:** EPA will select no more than two (2) lamp/ballast platforms from any given manufacturer per year. Having selected the lamp/ballast platform, EPA will then select for testing one specific fixture that contains each platform.

- B. **Third-Party Complaint Process:** Any party who believes that a non-compliant fixture is using the ENERGY STAR mark may request that EPA investigate the fixture's compliance. This request must be accompanied by laboratory test reports or other evidence indicating that the product does not meet ENERGY STAR requirements. The third party making the complaint shall remain anonymous in all communications between EPA and the manufacturer whose product is in question.

EPA will review the materials from the third party; will notify the manufacturer of the complaint; and if necessary request a corrective action plan be submitted within seven calendar days. Upon receipt and review of the corrective action plan, EPA will take one of the following actions:

- Determine that the fixture is eligible to meet the ENERGY STAR requirements, or
- Determine that the fixture is not qualified or not eligible to be qualified and either request additional information or take steps to remove the fixture from the ENERGY STAR Qualified Product List for a minimum of six months and/or ensure the manufacturer ceases use of the ENERGY STAR mark.

EPA reserves the right to terminate any partnership agreements with a manufacturer whose products repeatedly violate the specification

**Note:** The "Challenge Testing" section that was in Version 4.0 was removed in favor of a section summarizing EPA's Third Party Complaint process. This process still allows manufacturers and other parties to report alleged non-compliant products to EPA. The complete details of the process are available upon email request to RLF@icfi.com

- 6) **Effective Date:** The date that all ENERGY STAR qualified residential lighting fixtures must meet Version 4.1 will be defined as the *effective date* of the agreement. The ENERGY STAR Version 4.1 Eligibility Criteria (aka Specification) for Residential Light Fixtures shall go into effect on **November 1, 2007**. Any previously executed agreement on the subject of ENERGY STAR qualified residential light fixtures shall be terminated effective October 31, 2007.
- A. **Qualifying and Labeling Products under the Version 4.1 Specification:** All products, including models originally qualified prior to Version 4.1 with a **date of manufacture** on or after **November 1, 2007**, must meet the new Version 4.1 requirements in order to use the ENERGY STAR on the product or in product literature. The date of manufacture is specific to each unit, and is the date (e.g., month and year) of which a unit is considered to be completely assembled. Manufacturers may begin to test and submit products under Version 4.1 upon EPA's release of the final specification document. It is EPA's intent that all inventory of fixtures qualified prior to Version 4.1 and with a date of manufacture before November 1, 2007 will be sold by the manufacturer within six months after the effective date.
- B. **Elimination of Automatic Grandfathering:** EPA does not allow grandfathering under this Version 4.1 specification. Therefore, any product sold, marketed, or identified by the manufacturing partner as ENERGY STAR must meet the current specification in effect at that time.
- 7) **Future Specification Revisions:** ENERGY STAR reserves the right to change the specification should technological and/or market changes affect its usefulness to consumers, industry, or the environment. In keeping with current policy, revisions to the specification will be arrived at through industry discussions.

**Expiration of ENERGY STAR Qualification:** During future specification revisions EPA may choose to require complete new test data (i.e., test data that has been obtained within the six months prior to submitting the fixture for re-qualification) and documentation for all performance characteristics in order for the fixture to remain ENERGY STAR qualified. New test data may be required for new, revised and/or existing ENERGY STAR performance characteristics.

**Draft 1 ENERGY STAR Program Requirements for Residential Light Fixtures: Version 4.1 – ANNEX A**

**Note: No changes are proposed to Table 1 or Table 2 for this draft.**

**Table 1 – Indoor Fixtures**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
<p><b>Note:</b> Only electronic ballasts may be used to meet the requirements of this table. In addition, fixtures that utilize compact fluorescent lamps that do not have a plug-in base (i.e use a mogul, medium, or other screw base) are not eligible to earn the ENERGY STAR.</p>			
<p><b>Combined Lamp &amp; Ballast Requirements:</b></p>			
<p>System Efficacy Per Lamp Ballast Platform in Lumens Per Watt (LPW)<sup>1</sup>,</p>	<p>≥ 50 LPW for all lamp types below 30 total listed lamp watts.</p> <p>≥ 60 LPW for all lamp types that are ≤ 24 inches and ≥ 30 total listed lamp watts.</p> <p>≥ 70 LPW for all lamp types that are &gt; 24 inches and ≥ 30 total listed lamp watts.</p>	<p>IESNA LM-9; LM-66; ANSI C82.2</p>	<p>Laboratory test results must be produced using the specific lamp and ballast combination that will operate in the fixture. For this test, a sample of three or more lamps must be used. Two of the three samples must pass in order to qualify for ENERGY STAR.</p> <p>Provide:</p> <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the fixture and the test result for this performance characteristic; or</li> <li>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices.</li> </ol> <p><b>Note:</b> If the laboratory used for this test is accredited by NVLAP or one of its MRA signatories it must also have a scope of accreditation that includes the method of measurement reference standard for this performance characteristic.</p>
<p><b>Lamp Requirements:</b></p>			
<p>Lamp Life</p>	<p>For lamps shipped with the fixtures, the average rated life of the lamp must be ≥ 10,000 hours.</p>	<p>IESNA LM-40-01; LM-65-01;</p>	<p>Laboratory test results must be produced using the specific lamp that will operate in the fixture</p>

<sup>1</sup> Efficacy shall be determined by the following equation:  

$$\text{Efficacy [Lumens per Watt]} = \frac{\text{Measured Lamp Lumens [Lumens]}}{\text{Measured Input Power [Watts]}}$$

Lamp Lumens: Lamp lumens must be measured using the lamp and ballast that are shipped with the fixture.  
Input Power: Input power must be measured with the lamp and ballast that are shipped with the fixture.

Draft 1 ENERGY STAR Program Requirements for Residential Light Fixtures: Version 4.1 – ANNEX A

**Note: No changes are proposed to Table 1 or Table 2 for this draft.**

**Table 1 – Indoor Fixtures**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
	<p>If the lamp is not shipped with the fixture, product packaging must meet the requirements set forth in the “Product Packaging for Consumer Awareness” section of this Table.</p>	<p>IEC 60091; IEC 60901; ANSI C82.1; ANSI C82.11</p>	<p>and either the ballast that will operate in the fixture or a commercially- available ballast that meets the applicable ANSI ballast requirements for the lamp being tested. For this test, a sample of ten or more lamps must be used.</p> <p>Provide:</p> <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the fixture and the test result for this performance characteristic; or</li> <li>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or</li> <li>4. a test report from an ISO 9000 registered facility.</li> </ol> <p>Manufacturers may obtain ENERGY STAR conditional qualification for their fixture if all of the following items are provided:</p> <ol style="list-style-type: none"> <li>1. A letter on letterhead from a NVLAP laboratory, one of its MRA signatories, or an ISO 9000 registered facility demonstrating lamp life testing has begun.</li> <li>2. A laboratory report proving that testing has been completed for at least 40% of rated life.</li> <li>3. The date for testing completion.</li> </ol> <p>Conditional approval will only be granted for a period of no longer than 325 days.</p> <p><b>Note:</b> If the laboratory used for this test is accredited by NVLAP or one of its MRA signatories it must also have a scope of accreditation that includes the method of measurement reference standard for this</p>

**Draft 1 ENERGY STAR Program Requirements for Residential Light Fixtures: Version 4.1 – ANNEX A**

**Note: No changes are proposed to Table 1 or Table 2 for this draft.**

**Table 1 – Indoor Fixtures**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
			performance characteristic.
Lumen Maintenance	For lamps indicated on the fixture packaging or shipped with the fixtures, the lamp shall have an average rated lumen maintenance of at least 80% of initial lamp lumens at 40% (4,000 hours minimum) rated lamp life.	IESNA LM-40-01; IESNA LM-9-99; IESNA LM-65-01; IESNA LM-66-00; ANSI C78.5	<p>Laboratory test results must be produced using the specific lamp that will operate in the fixture. For this test, a sample of ten or more lamps must be used to demonstrate that at least 80% of the samples achieved the required lumen maintenance value.</p> <p>Provide:</p> <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by NVLAP, one of its MRA signatories; or</li> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the fixture and the test result for this performance characteristic; or</li> <li>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or</li> <li>4. a test report from an ISO 9000 registered facility.</li> </ol>
Color Rendering Index	<p>For lamps shipped with the fixtures, the color rendering index must meet the following requirements:</p> <p>≥ 80 for compact fluorescent lamps.                      ≥ 75 for linear fluorescent lamps.</p> <p>If the lamp is not shipped with the fixture, product packaging must meet the requirements set forth in the “Product Packaging for Consumer Awareness” section of this Table.</p>	IESNA LM-58; CIE 13.3	<p>Laboratory test results must be produced using the specific lamp that will operate in the fixture. For this test, a sample of ten or more lamps must be used to demonstrate that at least 80% of the samples achieved the required color rendering index value.</p> <p>Provide:</p> <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the fixture and the test result for this performance characteristic; or</li> <li>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices.</li> </ol>

Draft 1 ENERGY STAR Program Requirements for Residential Light Fixtures: Version 4.1 – ANNEX A

**Note: No changes are proposed to Table 1 or Table 2 for this draft.**

**Table 1 – Indoor Fixtures**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
			<p><b>Note:</b> If the laboratory used for this test is accredited by NVLAP or one of its MRA signatories it must also have a scope of accreditation that includes the method of measurement reference standard for this performance characteristic.</p>
<p>Correlated Color Temperature</p>	<p>For lamps shipped with the fixtures, the lamps must have one of the following designated correlated color temperatures (CCT): 2700K, 3000K, 3500K, 4100K, 5000K, or 6500K.</p> <p>If the lamp is not shipped with the fixture, product packaging must meet the requirements set forth in the “Product Packaging for Consumer Awareness” section of this Table.</p>	<p>IESNA LM-58; LM-16</p>	<p>Laboratory test results must be produced using the specific lamp that will operate in the fixture. For this test, a sample of ten or more lamps must be used. Test results must demonstrate that at least 90% of the lamps tested fall within a 7-step ANSI Mac Adam ellipse.</p> <p>Provide:</p> <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by NVLAP, one of its MRA signatories; or</li> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the fixture and the test result for this performance characteristic; or</li> <li>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or</li> <li>4. a test report from an ISO 9000 registered facility.</li> </ol> <p>It is also intended that the lamp manufacturer will meet the following quality requirements during the production runs of each lamp model:</p> <ol style="list-style-type: none"> <li>1. The lamp manufacturer is required to maintain color control such that a minimum of 90 percent of the ongoing production (as represented by samples tested from each production shift for the same color and when typically evaluated over 12 month period) will fall within the 7 step Mac Adam color ellipse associated with the designated</li> </ol>

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**Table 1 – Indoor Fixtures**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
			<p>(manufacturer declared) target color.</p> <ol style="list-style-type: none"> <li>2. For the purposes of meeting color control the lamp manufacturer must maintain testing equipment calibrated to international practices and standards and must compile the ongoing color control data in a manner so that it can be easily reviewed upon EPA request.</li> <li>3. At a minimum, the manufacturer's color quality control program must maintain the following information for a 3-year period:               <ol style="list-style-type: none"> <li>a. Test dates and sample size (minimum of two lamps per production shift)</li> <li>b. Test results (x,y) for each sample lamp measured</li> <li>c. Test results (all x,y data) for sample lamps plotted graphically against the designated seven step color ellipse and available for review at least on a quarterly basis</li> <li>d. Records to substantiate that 90 percent of the (x,y) data points fall within the applicable seven (7) step Mac Adam ellipse. Manufacturers are encouraged to exceed this target.</li> </ol> </li> </ol>
Lamp/Lampholder Compatibility	<p>For lamps indicated on the fixture packaging or shipped with the fixtures, lamps must utilize an ANSI/IEC standardized lamp base configuration, as defined by ANSI C81.61 and IEC 60061-1.</p> <p>The lampholder must be designed to accept lamps with ANSI/IEC standardized lamp base configurations for all applicable wattages. For example, if the ballast can operate lamps with multiple wattages (e.g., an 18W, 26W, or 32W lamp) then the lampholder must be designed to accept lamps with ANSI/IEC standardized lamp base configurations for all three applicable</p>	<p>Lamp Base Configuration: ANSI C81.61; IEC 60061-1</p> <p>For Lamps Compliant with an ANSI-IEC Standard (for lamp dimensions and electrical parameters): ANSI C78.901-2001; ANSI C78.81-2001; IEC 60901; IEC 60081</p> <p>Lamps Not Compliant with an ANSI-IEC Standard (for lamp dimensions and electrical</p>	<p>Lamp Base Configuration : Provide manufacturer data indicating the lamp base type used.</p> <p>Lamps Compliant with an ANSI-IEC Standard (for lamp dimensions and electrical parameters): Provide manufacturer data indicating applicable ANSI-IEC lamp data sheet number.</p> <p>Lamps Not Compliant with an ANSI-IEC Standard (for lamp dimensions and electrical parameters): Provide a manufacturer lamp specification sheet that describes the following (use the ANSI lamp data sheets found in ANSI</p>

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**Table 1 – Indoor Fixtures**

<b>Performance Characteristic</b>	<b>ENERGY STAR Requirements</b>	<b>Methods of Measurement Reference Standards</b>	<b>Required Documentation</b>
	<p>wattages.</p> <p>In addition, lamps shall either:</p> <ul style="list-style-type: none"> <li>Meet the requirements of an ANSI/IEC standardized lamp specification sheet, as defined by ANSI C78.901-2001 and IEC 60901 (for compact fluorescent lamps) or ANSI C78.81-2001 and IEC 60081 (for linear lamps) if an applicable standard exists, or,</li> <li>If no ANSI/IEC lamp standard exists (e.g., a spiral compact fluorescent lamp), a custom lamp specification sheet must be provided at the time of submittal.</li> </ul>	<p>parameters): ANSI C78.901-2001; ANSI C78.81-2001 (used as a reference for the format and type of information required on a custom lamp specification sheet)</p>	<p>C78.901 and C78.81 as a reference for the format and type of information requested):</p> <ol style="list-style-type: none"> <li>Lamp Description, including: <ul style="list-style-type: none"> <li>Lamp Model Number</li> <li>Nominal Wattage</li> <li>Bulb Designation / Lamp Size (i.e., T4, T5, T8, etc.)</li> <li>Lamp Base Type as defined by ANSI C81.61 or IEC 60061-1(i.e., 2G13, GR10q, etc.)</li> <li>Starting Circuit Application (i.e., rapid start, preheat, etc.)</li> </ul> </li> <li>Dimensional Characteristics, including diagram</li> <li>Lamp Operating Characteristics, including: <ul style="list-style-type: none"> <li>Approximate wattage (W)</li> <li>Voltage (V)</li> <li>Current (A)</li> </ul> </li> </ol>
Lamp Labeling Requirement	For lamps shipped with fixtures, a manufacturer designation that encompasses the lamp manufacturer name, wattage, correlated color temperature, and color rendering index must be labeled on the lamp or lamp base.	No Standard Available (Use manufacturer protocol)	Provide a copy of the actual language that will be included on the base of the lamp.
<b>Electronic Ballast Requirements (Note: Magnetic Ballasts May Not Be Used in Indoor Fixtures):</b>			
General	Per ANSI C82.11 Section 5 except paragraph 5.3.1.		
Lamp Start Time	The time needed after switching on the lamp to start continuously and remain illuminated must be an average of one second or less.	ANSI C82.11-5.2	<p>Laboratory test results must be produced using the specific lamp and ballast combination that will operate in the fixture. For this test, a sample of three or more lamps must be used. Two of the three samples must pass in order to qualify for ENERGY STAR.</p> <p>Provide:</p> <ol style="list-style-type: none"> <li>a test report from a laboratory accredited by</li> </ol>

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**Table 1 – Indoor Fixtures**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
			NVLAP or one of its MRA signatories; or 2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the fixture and the test result for this performance characteristic; or 3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or 4. a test report from an OSHA NRTL laboratory.
Power Factor	≥ 0.5	ANSI C82.11-3.3.1	Laboratory test results must be produced using the specific ballast that will operate in the fixture. For this test, a sample of three or more ballasts must be used. At least two of the three samples must pass in order to qualify for ENERGY STAR.  Provide: 1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or 2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the fixture and the test result for this performance characteristic; or 3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or 4. a test report from the manufacturer
Lamp Current Crest Factor	≤ 1.7	ANSI C82.11-3.3.3 and 5.6 ANSI C82.1-5.6.1	Laboratory test results must be produced using the specific ballast that will operate in the fixture. For this test, a sample of three or more ballasts must be used. At least two of the three samples must pass in order to qualify for ENERGY STAR.  Provide: 1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or 2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the fixture and the test

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**Table 1 – Indoor Fixtures**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
			result for this performance characteristic; or 3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or 4. a test report from an OSHA NRTL laboratory.
Maximum Measured Ballast Case Temperature During Normal Operation Inside Fixture(s)	<p><u>Not</u> to exceed the ballast manufacturer maximum recommended ballast case temperature during normal operation inside a fixture.</p> <p><b>Note:</b> This performance characteristic is separate and distinct from thermal requirements established by UL, which governs safety rather than longevity of the ballast. All qualified fixtures are expected to meet this requirement, including linear, suspended, close-to-ceiling, IC, ICAT and Non-IC recessed canisters, etc. as well as those fixtures that may be exempt from UL1598.</p>	<p>UL 1598, Section 11 (Acceptable when the thermocouple is placed at the hot-spot location indicated by the ballast manufacturer.)</p> <p style="text-align: center;">-OR-</p> <p>Lighting Research Center (LRC) “Proposed Durability Testing Method: Temperature” available at <a href="http://www.lrc.rpi.edu/programs/lightingTransformation/pdf/durabilityTestingFinalReport.pdf">http://www.lrc.rpi.edu/programs/lightingTransformation/pdf/durabilityTestingFinalReport.pdf</a></p> <p><b>Note:</b> All qualified fixtures are expected to meet the Measured Maximum Ballast Case Temperature During Normal Operation Inside Fixture(s) requirement. This includes every qualified fixture including linear, suspended, close-to-ceiling, IC, ICAT and Non-IC recessed canisters, etc. as well as those fixtures that may be exempt from UL1598.</p>	<p>Laboratory test results must be produced using the fixture with the highest operating temperature among all fixtures being qualified, the specific ballast that will operate in the fixture, and a lamp with the same wattage and lamp type (e.g., triple-tube, quad tube, spiral) that will operate in the fixture. For this test, a sample of one or more fixtures must be used.</p> <p>The supplemental documentation should include the following:</p> <ul style="list-style-type: none"> <li>• Fixture model(s) tested</li> <li>• Lamp model(s) and ballast model(s) tested</li> <li>• Measured maximum ballast case temperatures</li> <li>• Ambient temperature</li> <li>• Test procedure, including description of fixture installation, thermocouple location(s), and time that elapsed before readings were taken.</li> <li>• Ballast Manufacturer Maximum Recommended Case Temperature During Normal Operation Inside the Fixture(s)</li> <li>• Ballast Hot Spot Location Diagram from the ballast manufacturer</li> </ul> <p>Provide a test report from:</p> <ol style="list-style-type: none"> <li>1. a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>2. an OSHA NRTL laboratory; or</li> </ol>

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Table 1 – Indoor Fixtures

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
			3. the fixture or ballast manufacturer
Electromagnetic and Radio Frequency Interference	Ballast must meet FCC requirements for consumer use (FCC 47 CFR Part 18 Consumer Emission Limits)	Consumer Limits Per FCC 47 CFR Part 18.305 and 18.307	No supplemental documentation required. <b>Note:</b> A laboratory test report must be submitted upon EPA request.
Ballast Frequency	20 to 33 kHz or $\geq$ 40 kHz	Oscilloscope instruction manual	Laboratory test results must be produced using the specific ballast that will operate in the fixture. At least two of the three samples must pass in order to qualify for ENERGY STAR.  Provide: <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the fixture and the test result for this performance characteristic; or</li> <li>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or</li> <li>4. a test report from the manufacturer</li> </ol>
Transient Protection	Per ANSI C82.11b, paragraph 5.10.1 (100kHz Ring Wave, 2.5kV, both common mode and differential mode, 7 strikes)	ANSI C82.11b, paragraph 5.10.1	Laboratory test results must be produced using the specific ballast that will operate in the fixture. For this test, a sample of three or more ballasts must be used. All samples must pass in order to qualify for ENERGY STAR.  Provide: <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> </ol>

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**Table 1 – Indoor Fixtures**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
			<ol style="list-style-type: none"> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the fixture and the test result for this performance characteristic; or</li> <li>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or</li> <li>4. a test report from the manufacturer</li> </ol>
End of Life Protection	<p>All ballasts that operate lamps sized T5 and smaller must contain an end of life protection circuit. For ballasts that operate multiple lamps and are required to have end of life protection, the ballast must shut down no more than two lamps when one of the lamps has reached end of life. For example, a fixture with one ballast and five lamps must not shut down more than the lamp that has reached end of life plus one additional lamp.</p>	IEC 61347-2-3 Amendment 1 to Edition 1 2004-06 (or ANSI C82.11-2005, upon its release)	<p>Laboratory test results must be produced using the specific ballast that will operate in the fixture. For this test, a sample of one or more ballasts must be used.</p> <p>For all ballasts that that operate T4 and/or T5 sized lamps, demonstrate that the ballast is in compliance with the referenced standards by providing:</p> <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the fixture and the test result for this performance characteristic; or</li> <li>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or</li> <li>4. a test report from the ballast manufacturer</li> </ol> <p>For all ballasts that operate T3 and smaller sized lamps, provide from the ballast manufacturer a circuit diagram and an accompanying engineering description outlining the scheme that is used to achieve the end of life function within the ballast.</p>
Dimming	Torchiere style portable fixtures shall be dimmable from 100% to 30%, or less, of maximum light output, or be switchable to three levels of brightness, not including the off position.	No Standard Available (Use manufacturer protocol)	<p>No supplemental documentation required.</p> <p><b>Note:</b> A laboratory test report proving the fixture is dimmable from 100% to 30% must be</p>

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**Table 1 – Indoor Fixtures**

<b>Performance Characteristic</b>	<b>ENERGY STAR Requirements</b>	<b>Methods of Measurement Reference Standards</b>	<b>Required Documentation</b>
	Other fixture types that utilize dimmable ballasts shall be dimmable from 100% to 30%, or less, of maximum light output, or be switchable to three levels of brightness, not including the off position.		submitted upon EPA request.
Safety - Ballasts and “Non-Edison base Fluorescent Adapters”	The cover page of a safety test report or a general coverage statement must be provided to demonstrate compliance with ANSI/UL 935 or UL 1993, as appropriate.	ANSI/UL 935 or UL 1993	Provide the cover page of a safety test report or a general coverage statement from an OSHA NRTL laboratory.
<b>Fixture Requirements:</b>			
Fixture Warranty	A written warranty must be included with fixture packaging at the time of shipment, which covers repair or replacement of defective parts of the fixture housing, optics, trim and electronics (excluding the lamp) for a minimum of two years from the date of purchase.	No Standard Available (Use manufacturer protocol)	Provide a copy of the actual two-year fixture manufacturer written warranty that is included with product packaging.
Noise	Class A sound rating for electronic ballasts within the fixture, not to exceed a measured level of 24 dBA (audible) when the ballast is installed in the fixture.	Class A sound rating for electronic ballasts within the fixture, not to exceed a measured level of 24 dBA (audible) when the ballast is installed in the fixture and is measured using a sound meter (similar in performance to B&K type 2209) where the microphone is located 12 inches from the fixture in any direction.	No supplemental documentation required.  <b>Note:</b> A laboratory test report must be submitted upon EPA request.
Lamp Shipment Requirement	All indoor fixtures must be shipped with a lamp, except for the following fixture types: 1. Recessed downlight fixtures and recessed downlight retrofit kits 2. Fixtures using linear fluorescent lamps		
Replaceable Ballast	Ballasts in all fixtures (including portables) must be accessible and removable by an electrician without the cutting of wires and without damage to the fixture housing, trim, decorative elements or the carpentry (e.g., ceiling drywall) to which the	No Standard Available (Use manufacturer protocol)	Provide a copy of the language that includes guidance on ballast replacement and states that the ballast is replaceable with the use of a “qualified electrician.”

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**Table 1 – Indoor Fixtures**

<b>Performance Characteristic</b>	<b>ENERGY STAR Requirements</b>	<b>Methods of Measurement Reference Standards</b>	<b>Required Documentation</b>
	fixture is attached.		
Safety - Portable Fixtures	The cover page of a safety test report or a general coverage statement must be provided to demonstrate compliance with ANSI/UL 153.	ANSI/UL 153	Provide the cover page of a safety test report or a general coverage statement from an OSHA NRTL laboratory.
Safety - Hardwired Fixtures	The cover page of a safety test report or a general coverage statement must be provided to demonstrate compliance with UL 1598.	UL 1598	Provide the cover page of a safety test report or a general coverage statement from an OSHA NRTL laboratory.
Recessed Downlight Fixtures- Insulation Contact (IC)-Rated	Recessed downlight fixtures that are either IC-Rated for direct contact with insulation or non IC-Rated may qualify as ENERGY STAR. For fixtures to be considered IC-Rated they must be approved for zero clearance insulation cover (IC) by an OSHA NRTL laboratory. Recessed downlight fixtures that are IC-Rated must also meet the requirements for air tight fixtures, listed below.		
Recessed Downlight Fixtures-Air Tight For Restricted Air Movement	<p>Recessed downlight fixtures that are either air tight or not air tight may qualify as ENERGY STAR. For fixtures to be considered air tight, the housing or certified/listed accessory must have leakage less than 2.0 cubic feet per minute (CFM) at 75 Pascals (or 1.57 lbs/ft<sup>2</sup>) when tested in accordance with ASTM E283 and shall be sealed with a gasket or caulk.</p> <p>For recessed downlight fixtures that are air tight, the following measures must be taken to ensure that fixtures can be properly installed and inspected:</p> <ol style="list-style-type: none"> <li>1. Product packaging must meet the requirements set forth in the “Product Packaging for Consumer Awareness Requirements” section below.</li> <li>2. The fixture itself must include a label certifying “air tight”, or similar designation, to show air leakage less than 2.0 CFM at 75 Pascals when tested in accordance with</li> </ol>		

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Table 1 – Indoor Fixtures

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
	<p>ASTM E283. The label must be clearly visible to a building inspector.</p> <p>3. Installation instructions must be included listing all components of the assembly that will be necessary to ensure an airtight installation and how the components should be properly installed. For example, depending on the method used to achieve airtight operation, the instructions should alternatively show how a gasket is to be attached, what type of caulk to use and how it should be applied, or which certified airtight trim kits are designed to be installed with the luminaire housing.</p>		
<p>Product Packaging for Consumer Awareness Requirements</p>	<p><u>For fixtures that are not shipped with lamps</u>, product packaging must include a list of lamp types that would ensure ENERGY STAR quality and performance when paired with the qualifying fixture. This list must be clearly visible to the consumer on the fixture packaging.</p> <p>Manufacturers are not required to provide specific lamp manufacturer names and model numbers on the packaging. Rather, generic lamp listings, such as the NEMA or ANSI generic descriptions including a color designation (e.g., F32T8/830 or CFQ26W/G24q/827), will suffice. In addition, packaging should suggest that consumers select a lamp with a rated life of 10,000 hours or more.</p> <p><b>Note: only recessed downlight fixtures, recessed downlight retrofit kits, and fixtures using linear lamps may ship without a lamp.</b></p> <p><u>For fixtures that are shipped with lamps</u>, product packaging language is required that clearly describes the nominal color designation of the lamp in units of Kelvin (i.e., 2700K, 3000K,</p>	<p>No Standard Available (Use manufacturer protocol)</p>	<p>Provide a written copy or a PDF graphic of the language that will be displayed on product packaging and within the packaging, as required (i.e., installation instructions for air-tight rated fixtures).</p>

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**Table 1 – Indoor Fixtures**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
	<p>3500K, 4100K, 5000K, or 6500K).</p> <p><u>For recessed downlight fixtures that are IC-Rated</u>, product packaging must clearly state this rating. The language must be clearly visible on the product packaging. The IC-Rated designation will also be included in the fixture description included in the Qualified Product list posted on the ENERGY STAR Web site. Sample language: “IC-Rated for direct contact with insulation”.</p> <p><u>For recessed downlight fixtures that are Air-Tight (AT) rated</u>, product packaging must clearly show that the fixture produces less air leakage than 2.0 CFM at 75 Pascals when tested in accordance with ASTM E283. The language must be clearly visible on the product packaging. The “air tight”, or similar, designation will also be included in the fixture description included in the Qualified Product list posted on the ENERGY STAR Web site. Sample language: “Certified Air Tight per ASTM E283.”</p>		

**Table 1A – Additional Requirements for Indoor Recessed Downlight Retrofit Kits**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
<b>Note:</b> The following ENERGY STAR performance requirements must be met by recessed downlight retrofit kits <b>in addition</b> to those listed in Table 1 – Indoor Fixtures, above.			
Reflectors	Reflectors must be included to maximize fixture efficiency.	No Standard Available (Use manufacturer protocol)	No supplemental documentation required.
Aperture	Maximum 7.0”	No Standard Available (Use manufacturer protocol)	No supplemental documentation required.
Air Tight For Restricted Air Movement	Only recessed downlight retrofit kits that are air tight may qualify as ENERGY STAR. For fixtures to be considered air tight, the housing or certified/listed accessory must	ASTM E283	Laboratory test results must be produced using each specific fixture that will be qualified. For this test, a

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**Table 1A – Additional Requirements for Indoor Recessed Downlight Retrofit Kits**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
	<p>have leakage less than 2.0 cubic feet per minute (CFM) at 75 Pascals (or 1.57 lbs/ft<sup>2</sup>) when tested in accordance with ASTM E283 and shall be sealed with a gasket or caulk.</p> <p>For recessed downlight retrofit fixtures, the following measures must be taken to ensure that fixtures can be properly installed and inspected:</p> <ol style="list-style-type: none"> <li>1. Product packaging must meet the requirements set forth in the “Product Packaging for Consumer Awareness” section within this table, below.</li> <li>2. The fixture itself must include a label certifying airtight or similar designation to show air leakage less than 2.0 CFM at 75 Pascals when tested in accordance with ASTM E283. The label must be clearly visible to a building inspector.</li> <li>3. Installation instructions must be included listing all components of the assembly that will be necessary to ensure an airtight installation and how the components should be properly installed. For example, depending on the method used to achieve air-tight operation, the instructions should alternatively show how a gasket is to be attached, what type of caulk to use and how it should be applied, or which certified airtight trim kits are designed to be installed with the luminaire housing.</li> </ol>		<p>sample of one or more fixtures must be used.</p> <p>Provide a test report from:</p> <ol style="list-style-type: none"> <li>1. a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>2. an OSHA NRTL laboratory; or</li> <li>3. the fixture manufacturer</li> </ol>
Electrical Connections	Edison lamp socket with wire “pigtail” to the ballast.	No Standard Available (Use manufacturer protocol)	Supply engineering description and/or schematic.
Safety – Fixture Conversions, Retrofits	<p>Fixtures must be tested and listed by an OSHA NRTL laboratory as acceptable for compliance with NFPA 70, National Electrical Code (NEC).</p> <p>The cover page of a safety test report or a general coverage statement must be provided to demonstrate compliance with UL 1598 and UL 1598B.</p>	UL 1598 and UL 1598B	Provide the cover page of a safety test report or a general coverage statement from an OSHA NRTL laboratory.
Product Packaging for Consumer Awareness	<p>Recessed downlight retrofit kit packaging and instructions must clearly indicate:</p> <ol style="list-style-type: none"> <li>1. What fixture model numbers the recessed downlight</li> </ol>	No Standard Available (Use manufacturer protocol)	Provide a written copy or a PDF graphic of the language that will be displayed on product packaging and within the

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**Table 1A – Additional Requirements for Indoor Recessed Downlight Retrofit Kits**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
Requirements	retrofit kits are compatible with. 2. Whether or not the product is dimmable. If dimmable, user instructions must clearly indicate what type of dimming circuit it can be used on. 3. Any known incompatibility with photo controls, dimmers or timing devices. 4. Airtight or similar designation to show air leakage less than 2.0 CFM at 75 Pascals when tested in accordance with ASTM E283. The language must be clearly visible on the product packaging. The “air tight”, or similar, designation will also be included in the fixture description included in the Qualified Product list posted on the ENERGY STAR Web site. Sample language: “Certified Air Tight per ASTM E283.”		packaging, as required (i.e., installation instructions for air-tight rated fixtures).

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**Table 2A – Outdoor Fixtures: Compliance Through Efficient Light Sources**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
<p><b>Note:</b> Only electronic ballasts may be used to meet the requirements of this table with the exception of high intensity discharge lamps, such as metal halide or high pressure sodium lamps. In these cases magnetic ballasts can still be used. In addition, fixtures that utilize compact fluorescent lamps that do not have a plug-in base (i.e., use a mogul, medium, or other screw base) are not eligible to earn the ENERGY STAR. For example, a screw-based compact fluorescent lamp may not be used, though a metal halide lamp may be used.</p>			
<p><b>Combined Lamp &amp; Ballast Requirements:</b></p>			
<p>System Efficacy Per Lamp Ballast Platform in Lumens Per Watt (LPW)</p>	<p>≥ 40 LPW for all lamp types below 15 total listed lamp watts.</p> <p>≥ 50 LPW for all lamp types over 15 total listed lamp watts up to 30 total listed lamp watts</p> <p>≥ 60 LPW for all lamp types over 30 total listed lamp watts</p>	<p>IESNA LM-9; LM-66; ANSI C82.2</p>	<p>Laboratory test results must be produced using the specific lamp and ballast combination that will operate in the fixture. For this test, a sample of three or more lamps must be used. Two of the three samples must pass in order to qualify for ENERGY STAR.</p> <p>Provide:</p> <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the fixture and the test result for this performance characteristic; or</li> <li>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices.</li> </ol> <p><b>Note:</b> If the laboratory used for this test is accredited by NVLAP or one of its MRA signatories it must also have a scope of accreditation that includes the method of measurement reference standard for this performance characteristic.</p>
<p><b>Lamp Requirements:</b></p>			
<p>Lamp Life</p>	<p>For lamps shipped with the fixtures, the average rated life of the lamp must be ≥10,000 hours.</p> <p>If the lamp is not shipped with the fixture, product packaging must meet the requirements set forth in the “Product Packaging for Consumer Awareness” section of this Table.</p>	<p>IESNA LM-40-01; LM-65-01; IEC 60091; IEC 60901; ANSI C82.1; ANSI C82.11</p>	<p>Laboratory test results must be produced using the specific lamp that will operate in the fixture and either the ballast that will operate in the fixture or a commercially-available ballast that meets the applicable ANSI ballast requirements for the lamp being tested. For this test, a sample of ten or more lamps must be used.</p> <p>Provide:</p> <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by</li> </ol>

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**Note: No changes are proposed to Table 1 or Table 2 for this draft.**

**Table 2A – Outdoor Fixtures: Compliance Through Efficient Light Sources**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
			<p>NVLAP or one of its MRA signatories; or</p> <ol style="list-style-type: none"> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the fixture and the test result for this performance characteristic; or</li> <li>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or</li> <li>4. a test report from an ISO 9000 registered facility.</li> </ol> <p>Manufacturers may obtain ENERGY STAR conditional qualification for their fixture if all of the following items are provided:</p> <ol style="list-style-type: none"> <li>1. A letter on letterhead from a NVLAP laboratory, one of its MRA signatories, or an ISO 9000 registered facility demonstrating lamp life testing has begun.</li> <li>2. A laboratory report proving that testing has been completed for at least 40% of rated life.</li> <li>3. The date for testing completion.</li> </ol> <p>Conditional approval will only be granted for a period of no longer than 325 days.</p> <p><b>Note:</b> If the laboratory used for this test is accredited by NVLAP or one of its MRA signatories it must also have a scope of accreditation that includes the method of measurement reference standard for this performance characteristic.</p>
Lamp/Lampholder Compatibility	<p>For lamps indicated on the fixture packaging or shipped with the fixtures, lamps must utilize an ANSI/IEC standardized lamp base configuration, as defined by ANSI C81.61 and IEC 60061-1.</p> <p>The lampholder must be designed to accept lamps with ANSI/IEC standardized lamp base configurations for all applicable</p>	<p>Lamp Base Configuration: ANSI C81.61; IEC 60061-1</p> <p>Lamps Compliant with an ANSI-IEC Standard (for lamp dimensions and electrical parameters): ANSI C78.901-2001; ANSI C78.81-2001; IEC 60901; IEC 60081</p> <p>Lamps Not Compliant with an</p>	<p>Lamp Base Configuration: Provide manufacturer data indicating the lamp base type used.</p> <p>Lamps Compliant with an ANSI-IEC Standard (for lamp dimensions and electrical parameters): Provide manufacturer data indicating applicable ANSI-IEC lamp data sheet number.</p> <p>Lamps Not Compliant with an ANSI-IEC Standard (for lamp dimensions and electrical parameters): Provide a manufacturer lamp specification sheet that describes</p>

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**Note: No changes are proposed to Table 1 or Table 2 for this draft.**

**Table 2A – Outdoor Fixtures: Compliance Through Efficient Light Sources**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
	<p>wattages. For example, if the ballast can operate lamps with multiple wattages (e.g., an 18W, 26W, or 32W lamp) then the lampholder must be designed to accept lamps with ANSI/IEC standardized lamp base configurations for all three applicable wattages.</p> <p>In addition, lamps shall either:</p> <ul style="list-style-type: none"> <li>Meet the requirements of an ANSI/IEC standardized lamp specification sheet, as defined by ANSI C78.901-2001 and IEC 60901 (for compact fluorescent lamps) or ANSI C78.81-2001 and IEC 60081 (for linear lamps) if an applicable standard exists, or,</li> <li>If no ANSI-IEC lamp standard exists (e.g., a spiral compact fluorescent lamp), a custom lamp specification sheet must be provided at the time of submittal.</li> </ul>	<p>ANSI-IEC Standard (for lamp dimensions and electrical parameters): ANSI C78.901-2001; ANSI C78.81-2001 (used as a reference for the format and type of information required on a custom lamp specification sheet)</p>	<p>the following (use the ANSI lamp data sheets found in ANSI C78.901 and C78.81 as a reference for the format and type of information requested):</p> <ol style="list-style-type: none"> <li>Lamp Description, including: <ul style="list-style-type: none"> <li>Lamp Model Number</li> <li>Nominal Wattage</li> <li>Bulb Designation / Lamp Size (i.e., T4, T5, T8, etc.)</li> <li>Lamp Base Type as defined by ANSI C81.61 or IEC 60061-1(i.e., 2G13, GR10q, etc.)</li> <li>Starting Circuit Application (i.e., rapid start, preheat, etc.)</li> </ul> </li> <li>Dimensional Characteristics, including diagram</li> <li>Lamp Operating Characteristics, including: <ul style="list-style-type: none"> <li>Approximate wattage (W)</li> <li>Voltage( V)</li> <li>Current (A)</li> </ul> </li> </ol>
<b>Ballast Requirements:</b>			
Electromagnetic and Radio Frequency Interference	Ballast must be FCC rated for consumer use (FCC 47 CFR Part 18 Consumer Emission Limits).	Consumer Limits Per FCC 47 CFR Part 18.305 and 18.307	<p>No supplemental documentation required.</p> <p><b>Note:</b> A laboratory test report must be submitted upon EPA request.</p>
End of Life (EOL) Protection	All ballasts that operate lamps sized T5 and smaller must contain an end of life protection circuit, per ANSI/IEC requirements. For ballasts that operate multiple lamps and are required to have end of life protection, the ballast		

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**Note: No changes are proposed to Table 1 or Table 2 for this draft.**

**Table 2A – Outdoor Fixtures: Compliance Through Efficient Light Sources**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
	must shut down no more than two lamps when one of the lamps has reached end of life. For example, a fixture with one ballast and five lamps must not shut down more than the lamp that has reached end of life plus one additional lamp.		
<b>Fixture Requirements:</b>			
Maximum Input Power	150 watts		
Automatic Daylight Shutoff	The fixture must contain an integrated photosensor that automatically prevents operation during daylight hours. In addition, the control must automatically reactivate within 24 hours of a manual override or testing operation.	No Standard Available (Use manufacturer protocol)	Provide applicable sections of fixture manual(s) that demonstrate controls exist for each fixture being submitted.  <b>Note:</b> A laboratory test report must be submitted upon EPA request.
Fixture Warranty	A written warranty must be included with fixture packaging at shipment, which covers repair or replacement of defective parts of the fixture housing or electronics (excluding the lamp) for a minimum of two years from the date of purchase.	No Standard Available (Use manufacturer protocol)	Provide a copy of the actual two-year fixture manufacturer written warranty that is included with product packaging.
Replaceable Ballast	Ballasts must be accessible to and removable by an electrician without the cutting of wires and without damage to the fixture housing, trim, decorative elements or the carpentry (e.g. ceiling drywall) to which the fixture is attached.	No Standard Available (Use manufacturer protocol)	Provide a copy of the language that includes guidance on ballast replacement and states that the ballast is replaceable with the use of a “qualified electrician.”
Safety	Fixtures must be compliant with NFPA 70, the National Electrical Code (NEC), including requirements for wet or damp locations (Articles 410-	NFPA 70, the National Electrical Code (NEC), including requirements for wet locations when applicable (Articles 410-4a and Article	Provide the cover page of a safety test report or a general coverage statement from an OSHA NRTL laboratory. Include evidence of a Rain Test for Wet Locations, when applicable.

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**Note: No changes are proposed to Table 1 or Table 2 for this draft.**

**Table 2A – Outdoor Fixtures: Compliance Through Efficient Light Sources**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
	4a and Article 100).	100)	
Product Packaging for Consumer Awareness Requirements	<p>For fixtures that are not shipped with lamps, product packaging must include a list of lamp types that would provide ENERGY STAR quality and performance when paired with the qualifying fixtures. This list must be clearly visible to the consumer on the fixture packaging.</p> <p>Manufacturers are not required to provide specific lamp manufacturer names and model numbers on the packaging. Rather, generic lamp listings, such as the NEMA or ANSI generic descriptions including a color designation (e.g., F32T8/830 or CFQ26W/G24q/827), will suffice. In addition, consumers should be directed to select a lamp with a rated life of 10,000 hours or more.</p> <p>Product packaging must indicate the minimum (lowest) starting temperature for the lamp and ballast platform of the fixture.</p> <p>If the automatic daylight shutoff control can be adjusted such that the fixture can operate during full daylight, or automatic reactivation will not occur within 24 hours of a manual override or testing operation, additional packaging language is required that provides a</p>	No Standard Available (Use manufacturer protocol)	Provide a written copy or a PDF graphic of the language that will be displayed on product packaging and within the packaging, as required (i.e., installation instructions for air-tight rated fixtures).

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**Note: No changes are proposed to Table 1 or Table 2 for this draft.**

**Table 2A – Outdoor Fixtures: Compliance Through Efficient Light Sources**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
	range of settings that will result in the fixture complying with the specification. The language must be clearly visible to the consumer on the fixture packaging and in the fixture manual. Sample language: “To meet ENERGY STAR requirements the photosensor control knob must be set to x, y, or z to prevent operation during full daylight.”		

**Table 2B – Outdoor Fixtures: Compliance Through Reduced Operating Time**

Performance Characteristic	ENERGY STAR Specification	Methods of Measurement Reference Standards	Required Documentation
<b>Note:</b> All lamp types (fluorescent, incandescent, etc.) may be used to meet the requirements set forth in this table.			
<b>Fixture Requirements:</b>			
Maximum Input Power	250 watts		
Automatic Daylight Shutoff	The fixture must contain an integrated photosensor that automatically prevents operation during daylight hours. In addition, the control must automatically reactivate within 24 hours of a manual override or testing operation.	No Standard Available (Use manufacturer protocol)	Provide applicable sections of fixture manual(s) that demonstrate controls exist for each fixture being submitted.  <b>Note:</b> A laboratory test report must be submitted upon EPA request.
Motion Control	The fixture must contain an integrated motion sensor that employs infrared sensing technology. The sensor must: <ul style="list-style-type: none"> <li>• allow automatic shut-off of the lamp within 15 minutes of being manually activated by a switch or automatically activated by the sensor, and</li> <li>• automatically reset to sensing mode within 24 hours of a manual override or testing</li> </ul>	No Standard Available (Use manufacturer protocol)	Provide applicable sections of fixture manual(s) that demonstrate controls exist for each fixture being submitted.  <b>Note:</b> A laboratory test report must be submitted upon EPA request.

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**Note: No changes are proposed to Table 1 or Table 2 for this draft.**

**Table 2B – Outdoor Fixtures: Compliance Through Reduced Operating Time**

Performance Characteristic	ENERGY STAR Specification	Methods of Measurement Reference Standards	Required Documentation
	operation. The fixture must: <ul style="list-style-type: none"> <li>• have an indicator that visibly or audibly informs the device operator that the motion sensor is operating properly, or that it has failed or malfunctioned.</li> </ul>		
Fixture Warranty	A written warranty must be included with fixture packaging at shipment, which covers repair or replacement of defective parts of the fixture housing or electronics (excluding the lamp) for a minimum of two years from the date of purchase.	No Standard Available (Use manufacturer protocol)	Provide a copy of the actual two-year fixture manufacturer written warranty that is included with product packaging.
Replaceable Ballast	If a ballast is present in the fixture, it must be accessible to and removable by an electrician without the cutting of wires and without damage to the fixture housing, trim, decorative elements or the carpentry (e.g., ceiling drywall) to which the fixture is attached.	No Standard Available (Use manufacturer protocol)	Provide a copy of the language that includes guidance on ballast replacement and states that the ballast is replaceable with the use of a “qualified electrician.”
Safety	Fixtures must be compliant with NFPA 70, the National Electrical Code (NEC), including requirements for wet or damp locations (Articles 410-4a and Article 100).	NFPA 70, the National Electrical Code (NEC), including requirements for wet locations when applicable (Articles 410-4a and Article 100)	Provide the cover page of a safety test report or a general coverage statement from an OSHA NRTL laboratory. Include evidence of a Rain Test for Wet Locations, when applicable.
Product Packaging for Consumer Awareness Requirements	If the automatic daylight shutoff control can be adjusted such that the fixture can operate during full daylight, or automatic reactivation will not occur within 24 hours of a manual override or testing operation, product packaging language is required that provides a range of settings that will result in the fixture complying with the specification. The language must be clearly visible to the consumer on the fixture packaging <b>and</b> in the fixture manual. Sample language: “To meet ENERGY STAR requirements the photosensor control knob must be set to x, y, or z to prevent operation during full daylight.”	No Standard Available (Use manufacturer protocol)	Provide a written copy or a PDF graphic of the language that will be displayed on product packaging and within the packaging, as required (i.e., installation instructions for air-tight rated fixtures).

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**Note: No changes are proposed to Table 1 or Table 2 for this draft.**

**Table 2B – Outdoor Fixtures: Compliance Through Reduced Operating Time**

Performance Characteristic	ENERGY STAR Specification	Methods of Measurement Reference Standards	Required Documentation
	<p>If the integrated motion sensor can be adjusted such that shut-off will not occur within 15 minutes or automatic reset to sensing mode will not occur within 24 hours of a manual override or testing operation, product packaging must provide a range of settings that will resulting the fixture complying with the specification. The language must be clearly visible to the consumer on the fixture packaging <b>and</b> in the fixture manual. Sample language: “To meet ENERGY STAR requirements, the motion sensor control knob must be set to x, y, or z to allow automatic reset of the sensor”. In addition, the fixture must include instructions within the packaging that outlines step-by-step calibration instructions for the motion sensor.</p>		

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**Note:** Table 3 includes new additions to the program requirements for the Residential Light Fixtures Specification: Version 4.1, addressing requirements for GU-24 Based Integrated Lamps used with ENERGY STAR qualified fixtures.

**Table 3 – GU-24 Based Integrated Lamps**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Sample Size /Specific Requirements
System Efficacy <sup>2</sup> Per Integrated Lamp in Lumens Per Watt (LPW)	<p><u>Bare and Covered Lamps:</u> ≥ 50 LPW for all lamp types below 30 total listed lamp watts.</p> <p>≥ 60 LPW for all lamp types that are ≥ 30 total listed lamp watts.</p>	IESNA LM-9; LM-66; ANSI C78.5	<p><b>For this test a sample size of 10 or more lamps must be used to demonstrate that at least 80% of the samples achieved the required system efficacy value.</b> Five samples should be tested base-up and five samples should be tested base-down unless specific use or position is restricted by the manufacturer. If position is restricted, the manufacturer must test all 10 samples in the restricted position.</p> <p>Provide:</p> <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination and the test result for this performance characteristic; or</li> <li>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices.</li> </ol> <p><b>Note:</b> The NVLAP accredited laboratory used for this test must also have a scope of accreditation that includes the method of measurement reference standard for this performance characteristic.</p>
<p><b>Note:</b> The efficacy tiers for bare and covered GU-24 Based Integrated Lamps are unchanged from the RLF Specification Version 4.0. The efficacy requirement related to double-ended linear lamps is removed as it is not applicable to the GU-24 Based Integrated Lamp. The efficacy for covered lamps is the same as bare lamps; EPA is interested to receive comments indicating if these efficacy levels should be the same.</p> <p>Note these efficacy requirements meet or exceed Title 24-2005.</p>			
Average Rated Lamp Life	<p><u>Bare Lamps:</u> The average rated life of the lamp must be ≥ 10,000 hours.</p> <p><u>Covered Lamps, all types:</u> The average rated life of the lamp must be ≥ 8,000 hours.</p>	IESNA LM-40-01; LM-65-01; ANSI C78.5	<p><b>For this test a sample size of 10 or more lamps must be used.</b> Five (5) samples should be tested base-up and five (5) samples should be tested base-down, unless specific use or position appears on packaging.</p> <p>Provide:</p> <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination and the test result for this performance characteristic; or</li> <li>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or</li> <li>4. a test report from an ISO 9000 registered facility.</li> </ol> <p>Manufacturers may obtain ENERGY STAR conditional qualification if</p>
<p><b>Note:</b> The performance requirement for average rated lamp life is 10,000 hours for bare lamps and 8,000 hours for covered. Sample size and lab requirements remain unchanged from the RLF Specification Version 4.0. However more detail on base up/base down testing requirement, lab requirements and pass/fail criteria are included as applicable to self-ballasted products.</p>			

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			<p>at 40% of rated life 7 or more lamps are operational.</p> <ul style="list-style-type: none"> <li>○ One sample failure, acceptable;</li> <li>○ Two sample failures, requires submission of a product failure report from the manufacturer that describes in detail the specific reasons for sample product failures.</li> <li>○ Three sample failures, does not qualify.</li> </ul> <p>In addition, manufacturers must supply a letter on letterhead from a NVLAP accredited laboratory, one of its MRA signatories, or an ISO 9000 registered facility demonstrating lamp life testing has begun and the date of testing completion. Conditional approval will be granted for a period of no longer than 325 days.</p> <p><b>Note:</b> If the laboratory used for this test is accredited by NVLAP or one of its MRA signatories it must also have a scope of accreditation that includes the method of measurement reference standard for this performance characteristic. <i>Interim and final average rated lifetime tests must use the same samples.</i></p>
1,000-hour Lumen Maintenance	Must be greater than 90.0% of initial (100-hour) lumen output at 1,000 hours of rated life	IESNA LM-40-01; IESNA LM-9-99; IESNA LM-65-01; IESNA LM-66-00; ANSI C78.5 Section 4.10	<p><b>For this test a sample size of 10 or more lamps must be used.</b> Five (5) samples should be tested base-up and five (5) samples should be tested base-down, unless specific use or position is restricted by the manufacturer. If position restricted, manufacturer must test all 10 samples in restricted position. For this test, a sample of ten or more lamps must be used to demonstrate that at least 80% of the samples achieved the required lumen maintenance value.</p> <p>Provide:</p> <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories</li> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination and the test result for this performance characteristic; or</li> <li>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices.</li> </ol> <p><b>Note:</b> The NVLAP accredited laboratory used for this test must also have a scope of accreditation that includes the method of measurement reference standard for this performance characteristic.</p>
Lumen Maintenance at 40% of Rated Life	Must be greater than 80.0% of initial (100-hour) rating at 40% of model's rated life (Per ANSI C78.5, Section 4.10),		
<p><b>Note:</b> The performance requirements for lumen maintenance have been revised to include a 1,000 hour lumen maintenance requirement. EPA has added this requirement as an “early indicator” test for GU-24 products. In future specification revisions this requirement will be added for all indoor lamp types. Sample size and lab requirements remain unchanged from the RLF Specification Version 4.0. However more detail on base up/base down testing requirement, lab requirements and pass/fail criteria are included as applicable to self-ballasted products.</p>			

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			<p><i>1,000 hour lumen maintenance and lumen maintenance at 40% of rated life tests must use the same samples.</i></p>
<p>Accelerated Life/Stress Test (ALT)</p>	<p>GU-24 must remain functional for 2,880 cycles @ 60°C or 720 cycles at 80 °C (NOTE: These requirements are currently under development and review by EPA and industry. Final requirements may change)</p>	<p>Lighting Research Center Test Method (NOTE: currently underdevelopment, draft available from EPA)</p>	<p><b>For this test, the manufacturer can choose a sample size of five or ten ballasts. If a sample size of five is chosen, then ALL five ballasts must remain functional for the duration of the test. If a sample size of ten is used then one (1) ballast failure is permitted.</b> The ballast should be exposed to a series of thermal cycles in a thermal chamber at two different voltages (high and low) while operating at rapid cycling. (NOTE: These requirements are currently under development and review by EPA and industry. Final requirements may change based on future industry/stakeholder input. Complete reports on the ALT investigation and proposed procedures are available by contacting EPA).</p> <p><b>Laboratory requirements have been determined by LRC and replication of the equipment and methods is necessary in order to repeat the tests outside of LRC – this transitional strategy is being developed.</b></p>
<p><b>Note:</b> In 2005 and 2006 EPA commissioned the Lighting Research Center (LRC) to develop an accelerated life test/stress test for ballasts and GU-24 integrated lamps. The first round of results were released to the manufacturers' working group for review in 2006, but no changes to the outlined protocol have been recommended by the working group as of January 10, 2007. LRC is continuing the research and will duplicate some of the tests to ensure that the results are reliable. These tests will be completed by spring of 2007. EPA will monitor these results, share them with Partners, then release a second draft specification along with a revised protocol for comment by lamp/ballast manufacturers as well as existing ENERGY STAR for Residential Light Fixture Partners and other stakeholders. Copies of the latest research report are available upon email request to <a href="mailto:RLF@icfi.com">RLF@icfi.com</a>.</p>			
<p>Color Rendering Index</p>	<p>&gt; 80</p>	<p>IESNA LM-58; CIE 13.3</p>	<p><b>For this test, a sample of ten or more lamps must be used to demonstrate that at least 80% of the samples achieved the required color rendering index value.</b> Five (5) samples should be tested base-up and five (5) samples should be tested base-down, unless specific use or position is restricted by the manufacturer. If position restricted, manufacturer must test all 10 samples in restricted position.</p> <p>Provide:</p> <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used and the test result for this performance characteristic; or</li> </ol>
<p><b>Note:</b> The performance requirement for linear fluorescent lamps is not included because it is not applicable to the integrated GU-24 Based Integrated Lamp. Sample size and lab requirements remain unchanged from the RLF Specification: Version 4.0.</p>			

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			<p>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices.</p> <p><b>Note:</b> The NVLAP accredited laboratory used for this test must also have a scope of accreditation that includes the method of measurement reference standard for this performance characteristic.</p>
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Correlated Color Temperature	Lamps must have one of the following designated correlated color temperatures (CCT): 2700K, 3000K, 3500K, 4100K, 5000K, or 6500K.	IESNA LM-58; LM-16	<p><b>For this test, a sample of ten or more lamps must be used. Test results must demonstrate that at least 90% of the lamps tested fall within a 7-step ANSI Mac Adam ellipse.</b> Five (5) samples should be tested base-up and five (5) samples should be tested base-down, unless specific use or position is restricted by the manufacturer. If position restricted, manufacturer must test all 10 samples in restricted position.</p> <p>Provide:</p> <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by NVLAP, one of its MRA signatories; or</li> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination and the test result for this performance characteristic; or</li> <li>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or</li> </ol> <p>It is also intended that the lamp manufacturer will meet the following quality requirements during the production runs of each lamp model:</p> <ol style="list-style-type: none"> <li>1. The lamp manufacturer is required to maintain color control such that a minimum of 90 percent of the ongoing production (as represented by samples tested from each production shift for the same color and when typically evaluated over 12 month period) will fall within the 7 step Mac Adam color ellipse associated with the designated (manufacturer declared) target color.</li> <li>2. For the purposes of meeting color control the lamp manufacturer must maintain testing equipment calibrated to international practices and standards and must compile the ongoing color control data in a manner so that is can be easily reviewed upon EPA request.</li> <li>3. At a minimum, the manufacturer's color quality control program must maintain the following information for a 3-year period:             <ol style="list-style-type: none"> <li>a. Test dates and sample size (minimum of two lamps per production shift)</li> <li>b. Test results (x,y) for each sample lamp measured</li> <li>c. Test results (all x,y data) for sample lamps plotted graphically against the designated seven step color ellipse and available for review at least on a quarterly basis</li> <li>d. Records to substantiate that 90 percent of the (x,y) data points fall within the applicable seven (7) step Mac Adam ellipse. Manufacturers are encouraged to exceed this target.</li> </ol> </li> </ol>
<p><b>Note:</b> This performance characteristic remains unchanged from the RLF Specification: Version 4.0. However more detail on testing sample size, the base up/base down testing requirement, lab requirements and pass/fail criteria are included as applicable to self-ballasted products.</p>			

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Base	Lamp/Ballast Base configuration must utilize the GU-24 base.	<a href="http://www.lrc.rpi.edu/programs/lightingTransformation/lineVoltage/index.asp">http://www.lrc.rpi.edu/programs/lightingTransformation/lineVoltage/index.asp</a>	No supplemental documentation is required.
<p><b>Note:</b> This section references the LRC’s “Line-Voltage Socket Design Competition.” EPA intends to replace this reference with the appropriate GU-24 ANSI standard reference once it is finalized and released.</p>			
GU-24 Labeling for Consumer Replacement	A manufacturer designation that encompasses the lamp manufacturer name, wattage, correlated color temperature, and color rendering index must be labeled on the GU-24 base.	No Standard Available	Provide a copy of the actual language that is included on the base of the GU-24 product.
<p><b>Note:</b> This section was modified to accurately reflect the requirements needed by consumers to identify proper GU-24 replacement products.</p>			
General Ballast Requirement	Ballasts are required to meet the general requirement of ANSI C78.5, in addition to the specific requirements listed below.	ANSI C78.5	No supplemental documentation is required.
<p><b>Note:</b> This section is included as a general reference.</p>			
Lamp Start Time	The time needed after switching on the lamp to start continuously and remain illuminated must be one second or less.	ANSI C78.5 Section 4.7, for test conditions and methodology	<p><b>For this test a sample size of 10 or more lamps must be used to demonstrate that at least 80% of the samples achieved the required lamp start time.</b></p> <p>Five (5) samples should be tested base-up and five (5) samples should be tested base-down, unless specific use or position is restricted by the manufacturer. If position restricted, manufacturer must test all 10 samples in restricted position.</p>
<p><b>Note:</b> The performance requirement remains unchanged from the RLF Version 4.0 specification.</p>			
			<p>Provide:</p> <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> </ol>

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			<ol style="list-style-type: none"> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination and the test result for this performance characteristic; or</li> <li>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices.</li> </ol>
Run-up Time	Non-amalgam: Average of 10 samples tested must be less than 1.0 minute per ANSI C78.5, Section 3.11 and 4.8.	ANSI C78.5, Section 3.11 and 4.8	<p><b>For this test a sample size of 10 or more lamps must be used to demonstrate that at least 80% of the samples achieved the required run-up time.</b></p> <p>Five (5) samples should be tested base-up and five (5) samples should be tested base-down, unless specific use or position is restricted by the manufacturer. If position restricted, manufacturer must test all 10 samples in restricted position.</p> <p>Provide:</p> <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination and the test result for this performance characteristic; or</li> <li>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices.</li> </ol> <p><b>Note 1:</b> The NVLAP accredited laboratory used for this test must also have a scope of accreditation that includes the method of measurement reference standard for this performance characteristic.</p> <p><b>Note 2:</b> Partners must specify if their product contains amalgam mercury during the qualification submission process to be eligible for this requirement.</p>
	Amalgam: Average of 10 samples tested must be less than 3.0 minutes.	ANSI C78.5, Section 3.11 and 4.8	
<div style="border: 2px solid black; padding: 5px;"> <p><b>Note:</b> This is a new requirement to account for amalgam technology. EPA anticipates that covered lamps will utilize amalgam technology more often than bare lamps.</p> </div>			

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Power Factor	> 0.50	ANSI C82.11-3.3.1	<p><b>For this test a sample size of 10 or more lamps must be used to demonstrate that at least 80% of the samples achieved the required power factor.</b></p> <p>Five (5) samples should be tested base-up and five (5) samples should be tested base-down, unless specific use or position is restricted by the manufacturer. If position is restricted, the manufacturer must test all 10 samples in the restricted position.</p> <p>Provide:</p> <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination and the test result for this performance characteristic; or</li> <li>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices.</li> <li>4. a test report from the manufacturer</li> </ol>
<p><b>Note:</b> The power factor requirement remains unchanged from the RLF Version 4.0 specification.</p>			
Lamp Current Crest Factor			
<p><b>Note:</b> Requirements regarding Lamp Current Crest Factor have been struck for integrated ballasts. Because the lamp and ballast are integrated into a single product, concerns about proper operation of the ballast with alternate lamps are eliminated. In addition, the manufacturer has the ability to completely control compatibility between the selected components. Finally, testing for lamp current crest factor in integrated products is not practical as it would require disassembly of the lamp from the ballast prior to testing.</p>			
Maximum Measured Ballast Case Temperature During Normal Operation Inside Fixtures			
<p><b>Note:</b> This requirement is included in Table 1 for all fixtures.</p>			

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<p>Electromagnetic and Radio Frequency Interference</p>	<p>Ballast must meet FCC requirements for consumer use, FCC 47 CFR Part 2 (Equipment Authorization) and Part 18 (Consumer Emission Limits)</p>	<p>FCC 47 CFR Part 2 and Part 18</p>	<p><b>For this test, one unit per model must be tested.</b></p> <p>Provide:</p> <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination and the test result for this performance characteristic; or</li> <li>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or</li> <li>4. a test report from the manufacturer</li> </ol>
<p><b>Note:</b> Part 2 of FCC 47 CFR was added. This section is related to product type approval through the FCC.</p>			
<p>Ballast Frequency</p>	<p>20 to 33 kHz or &gt; 40 kHz</p>	<p>Oscilloscope instruction manual</p>	<p><b>For this test a sample size of 10 or more lamps must be used to demonstrate that at least 80% of the samples achieved the required lamp current crest factor.</b> Five (5) samples should be tested base-up and five (5) samples should be tested base-down, unless specific use or position is restricted by the manufacturer. If position is restricted, the manufacturer must test all 10 samples in the restricted position.</p> <p>Provide:</p> <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the fixture and the test result for this performance characteristic; or</li> <li>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or</li> <li>4. a test report from the manufacturer</li> </ol>
<p><b>Note:</b> The performance requirement remains unchanged from the RLF Version 4.0 specification; however more detail on testing sample size, the base up/base down testing requirement, lab requirements and pass/fail criteria are included as applicable to self-ballasted products.</p>			

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<p>Transient Protection</p>	<p>Per ANSI/IEEE C62.41 (01-May-1991), Category A, 7 strikes</p> <p>Note: One failure to meet 7 strikes will result in test failure and therefore, failure to meet the criteria.</p>	<p>Per ANSI/IEEE C62.41 (01-May-1991), Category A</p>	<p><b>For this test a sample size of 10 or more lamps must be used to demonstrate that at least 90% of the samples must achieve 7 strikes.</b> Five (5) samples should be tested base-up and five (5) samples should be tested base-down, unless specific use or position is restricted by the manufacturer. If position is restricted, the manufacturer must test all 10 samples in the restricted position. <i>(Must be unique sample for this test only).</i></p> <p>Provide:</p> <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination and the test result for this performance characteristic; or</li> <li>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or</li> <li>4. a test report from the manufacturer</li> </ol>
<p><b>Note:</b> The performance requirement for this test has been changed so that it is appropriate for self-ballasted lamps.</p>			
<p>End of Life Protection</p>	<p>All ballasts that operate lamps sized T5 and smaller must contain an end of life protection circuit.</p>	<p>IEC 61347-2-3 Amendment 1 to Edition 1 2004-06 (or ANSI C82.11-2005, upon its release)</p>	<p><b>For this test a sample size of 10 or more lamps must be used to demonstrate that at least 80% of the samples achieve end of life.</b> Five (5) samples should be tested base-up and five (5) samples should be tested base-down, unless specific use or position is restricted by the manufacturer. If position is restricted, the manufacturer must test all 10 samples in the restricted position.</p> <p>For all ballasts that that operate T4 and/or T5 sized lamps, demonstrate that the ballast is in compliance with the referenced standards by providing:</p> <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination and the test result for this performance characteristic; or</li> <li>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or</li> <li>4. a test report from the ballast manufacturer</li> </ol> <p>For all ballasts that operate T3 and smaller sized lamps, provide from the ballast manufacturer a circuit diagram and an accompanying engineering description outlining the scheme that is used to achieve</p>
<p><b>Note:</b> While EPA investigated referencing UL 1993 EOL standards to meet this requirement, research determined that the ANSI/IEC standard currently referenced in the RLF Version 4.0 specification is more stringent. Therefore, this reference has been maintained for this revision.</p>			

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			the end of life function within the ballast. No supplemental documentation required.
Dimming	GU-24 Based Integrated Lamps that utilize dimmable ballasts shall be dimmable from 100% to 30%, or less, of maximum light output.	No Standard Available	
<p><b>Note:</b> The 100-30% dimming requirement is consistent with Version 4.0 of the RLF Specification for torchieres.</p>			
Safety – Ballast and “Non Edison Base Fluorescent Adapters”	The cover page of a safety test report or a general coverage statement must be provided to demonstrate compliance with UL 1993.	UL 1993	Provide the cover page of a safety test report or a general coverage statement from an OSHA NRTL laboratory.
<p><b>Note:</b> This safety requirement references UL 1993. EPA understands from discussions with UL that the requirements of UL 1993 are applicable to products using a GU-24 base. EPA intends to work with UL to formalize inclusion of GU-24 in UL 1993.</p>			
Warranty			Provide an electronic draft of specific product packaging and warranty language for each GU-24 Based Integrated Lamp. Packaging must include the following information to be reviewed for qualification requirements: <ul style="list-style-type: none"> <li>- Model number</li> <li>- Wattage</li> <li>- Lumen output (must be 100 hour average)</li> <li>- Average rated lifetime</li> <li>- Target correlated color temperature</li> <li>- 800 number, or address, or web address</li> <li>- Equivalency to incandescent (if applicable – see Table 3A)</li> <li>- Starting temperature</li> <li>- Electromagnetic interference</li> <li>- Known incompatibility with controls and application exceptions</li> </ul>
Product Packaging for Consumer Awareness Requirements	(Product Packaging Language): In English, or English with additional languages.  For products that will be sold in Canada, packaging must include both English and French.	No Standard Available	
	(FTC Labeling Requirements): ENERGY STAR qualified compact fluorescent lamps and lamp	No Standard Available	

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	<p>systems must comply with the labeling requirements of the U.S. Federal Trade Commission Packaging Laws - FTC 16CFR Part 305.1-19.8</p>		
	<p>(Starting Temperature): Package must state the minimum starting temperatures or geographical zone of use and any other conditions for reliable starting to meet the starting time requirements of ANSI C78.5, Clause 4.7.</p>	<p>No Standard Available</p>	
	<p>(Incompatibility with Controls and Application Exceptions): Lamp package must clearly state any known incompatibility with photo controls, dimmers or timing devices. In addition, packaging should state specific applications exceptions. (e.g., applications that the CFL should not be used in).</p>	<p>No Standard Available</p>	