



# ENERGY STAR® Program Requirements for Residential Light Fixtures

## Eligibility Criteria – Version 4.2

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## ENERGY STAR® Program Requirements for Residential Light Fixtures

### Eligibility Criteria – Version 4.2

Below is the product specification (Version 4.2) for ENERGY STAR qualified residential light fixtures and replacement GU-24 base integrated lamps. 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 lamps, light emitting diodes, 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 photosensor 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 that 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 the lamp and its ballast. It does not include any replaceable or interchangeable parts, and utilizes the GU-24 base type.

- N. GU-24 Based Two-Piece Lamp: A term for a lamp-ballast unit that includes a ballast with the GU-24 base type paired with a standard pin based lamp. The ballast and lamp are separable, with the ballast designed to accept replacement pin based lamps.
- O. IEC: International Electrotechnical Commission.
- P. IESNA: Illuminating Engineering Society of North America.
- Q. ILAC: International Laboratory Accreditation Cooperation (NVLAP MRA Signatory).
- R. 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).
- S. Lamp: A generic term for a man-made source of light. By extension, the term is also used to denote sources that radiate in regions of the spectrum adjacent to the visible. In lighting parlance, the lamp is the replaceable light-generating component of a luminaire, usually a standardized element with a standard base, such as a screw base, pin base, or bayonet base, for mechanical and electrical coupling. [From IEEE Dictionary]
- T. 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. A lamp ballast platform also may refer to a lamp with an integral ballast.
- U. 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.
- V. Lampholder: A component of a fixture, which supplies power to the lamp and also holds the lamp in place.
- W. Light Emitting Diode (LED): A pn junction semiconductor device that emits incoherent optical radiation when biased in the forward direction. The output is a function of its physical construction, material used, and exciting current and may be in the ultraviolet, the visible, or in the infrared regions of the spectrum (from IESNA RP-16-05 Addendum a).
- X. LED Array: An assembly of LED packages, or dies on a printed circuit board or substrate, possibly with optical elements and additional thermal, mechanical, and electrical interfaces that are connected to the load side of LED driver. The LED array does not contain a power source, does not include an ANSI standardized base, and is not connected directly to the branch circuit [from IESNA RP-16-05 revision draft, March 2008].
- Y. LED Control Circuitry: Electronic components located between the power source and the LED package (or LED array, LED module) designed to limit voltage and current, to dim, to switch, or otherwise control the electrical energy to the LED package (or LED array, LED module). The circuitry does not include a power source [from IESNA RP-16-05 revision draft, March 2008].
- Z. LED Driver: A power source with integral LED control circuitry designed to meet the specific requirements of an LED package, or an LED array, or an LED module, or an LED lamp [from IESNA RP-16-05 revision draft, March 2008].
- AA. LED Light Engine: A subsystem of an LED luminaire that includes one or more LED packages, or an LED array, or an LED module; an LED driver; electrical and mechanical interfaces; and an integral heat sink to provide thermal dissipation. An LED light engine may be designed to accept additional components that provide aesthetic, optical, and environmental control (other than thermal dissipation). An LED light engine is designed to connect to the branch circuit. [from IESNA RP-16-05 revision draft, March 2008].
- BB. LED Luminaire: A complete LED lighting unit consisting of a light source and driver together with parts to distribute light, to position and protect the light source, and to connect the light source to a branch circuit. The light source itself may be an LED package, an LED array, an LED module, or an LED lamp. The LED luminaire is intended to connect directly to a branch circuit [from IESNA RP-16-05 revision draft, March 2008].

- CC. LED Package: An assembly of one or more LED dies that contains wire bond or other type of electrical connections, possibly with an optical element and thermal, mechanical, and electrical interfaces. The device does not include a power source, does not include an ANSI standardized base, and is not connected directly to the branch circuit. LED package can also be referred to as LED component [from IESNA RP-16-05 revision draft, March 2008].
- DD. LED Platform: (see LED Light Engine definition above)
- EE. 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.
- FF. Linear Fluorescent Lamp: A double based fluorescent lamp with a plug-in lamp base, including straight shaped or U-bent types.
- GG. Magnetic Ballast: A ballast that uses a magnetic core and copper winding and operates at the frequency of the line voltage.
- HH. MRA: Mutual Recognition Arrangement.
- II. NACLA: National Cooperation for Laboratory Accreditation (NVLAP MRA Signatory).
- JJ. NEMA: National Electrical Manufacturers Association.
- KK. NFPA: The National Fire Protection Association (United States), which develops the National Electrical Code (NEC).
- LL. NRTL: Nationally Recognized Testing Laboratory as recognized by OSHA's NRTL Program, which is a part of OSHA's Directorate of Technical Support.
- MM. NVLAP: National Voluntary Laboratory Accreditation Program.
- NN. Optics: Include reflectors, baffles, lenses and/or diffusers, all of which control the light distribution and the appearance of the lighted fixture.
- OO. OSHA: Occupational Safety & Health Administration.
- PP. 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.
- QQ. 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).
- RR. Power Source: A transformer, power supply, battery, or other device capable of providing current, voltage, or power within its design limits. This device contains no additional control capabilities [from IESNA RP-16-05 Addendum a].
- SS. 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.
- TT. Run-up Time: The time needed after switching on the electrical supply for the lamp to reach 80.0% of its stabilized luminous flux.
- UU. 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.
- VV. 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.
- WW. UL: Underwriters Laboratories.

- 2) **Qualifying Products:** The ENERGY STAR Residential Light Fixture specification covers the requirements for indoor and outdoor light fixtures, recessed downlight retrofit kits and replacement GU-24 base integrated lamps 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 fluorescent fixtures that use magnetic ballasts cannot be ENERGY STAR qualified under this Version 4.2 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.

**Inclusion of decorative LEDs (LED Hybrid Fixtures):** LEDs used only 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. This requirement applies to LED “hybrid” fixtures. For documentation requirements, please send an email request to [RLF@icfi.com](mailto:RLF@icfi.com).

- 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. Additional 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. Specifications for Indoor & Outdoor Fixtures Employing LED Light Engines for Primary Illumination can be found in Table 4.

- 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 and replacement GU-24 base integrated lamps as ENERGY STAR, provides information about acceptable sources of documentation, and states the testing standards and documentation required for performance characteristics.

**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 Annex A of this specification. Refer to the appropriate columns in Tables 1 through 4 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 or LED light engine, only one set of test results is required. For example, two fixtures that use the same lamp and ballast combination or LED light engine, but have different trim, lens and/or finish need only be tested once.

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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 Web site.

- For fluorescent 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 fluorescent fixture models with one ballast type that can work with multiple fluorescent 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), select "Manufacturers," and click on "Qualifying Product Information."

Acceptable Sources of Documentation:

- A. A variety of acceptable sources of documentation are referenced for each performance characteristic within Tables 1 through 4. 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 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 Approval** – 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 using compact fluorescent lamps. 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 4.
  - **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.aplac.org>.
- 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.
- For a list of laboratories trained by a representative of the Lighting Research Center (RPI) to perform ASSIST Recommends testing procedures, contact EPA.
- For a list of laboratories qualified and participating in the CALiPER program, visit [http://www.netl.doe.gov/ssl/comm\\_testing.htm](http://www.netl.doe.gov/ssl/comm_testing.htm)

C. Documentation Notes: The list of Documentation Conditions below is referenced in appropriate sections of the Annexes.

- [1] Laboratory test results must be produced using the specific *lamp and ballast* that will operate in the fixture.
- [2] Note: 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.
- [3] 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, if applicable, for the light source being tested.
- [4] Manufacturers may obtain ENERGY STAR conditional qualification for their fixture if all of the following items are provided:
  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.
  2. A laboratory report proving that testing has been completed for at least 40% of rated life.
  3. The date for testing completion.

Conditional approval will only be granted for a period of no longer than 325 days.

- [5] It is also intended that the fluorescent lamp manufacturer will meet the following quality requirements during the production runs of each lamp model:
1. The lamp manufacturer is required to maintain color control such that a minimum of 90% 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.
  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 such that it can be easily reviewed upon EPA request.
  3. At a minimum, the manufacturer's color quality control program must maintain the following information for a 3-year period:
    - a. Test dates and sample size (minimum of two lamps per production shift)
    - b. Test results (x,y) for each sample lamp measured
    - c. Test results (all x,y data) for sample lamps plotted graphically against the designated 7 step color ellipse and available for review at least on a quarterly basis
    - d. Records to substantiate that 90 percent of the (x,y) data points fall within the applicable 7 step Mac Adam ellipse. Manufacturers are encouraged to exceed this target.
- [6] Laboratory test results must be produced using the specific *ballast* that will operate in the fixture.
- [7] A laboratory test report must be submitted upon EPA request.
- [8] Note: A laboratory test report proving the fixture is dimmable from 100% to 30% must be submitted upon EPA request.
- [9] Manufacturers may obtain ENERGY STAR conditional qualification if at 40% of rated life, 8 or more lamps are operational.
- Two sample failures, acceptable.
  - Three sample failures, does not qualify.
- 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. Interim and final average rated lifetime tests must use the same samples.
- [10] 1,000 hour lumen maintenance and lumen maintenance at 40% of rated life tests must use the same samples.
- [11] Partners must specify if their product contains amalgam mercury during the qualification submission process to be eligible for this requirement.
- [12] Laboratory test results must be produced using each specific fixture that will be qualified.
- 5) Additional Quality Assurance Requirements: The following requirements outline a manufacturer-financed quality assurance system that allows 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 this program is available on the ENERGY STAR RLF Partner Resources page at: [http://www.energystar.gov/index.cfm?c=manuf\\_res.pt\\_lighting](http://www.energystar.gov/index.cfm?c=manuf_res.pt_lighting)



For current information on this program and guidelines, reference the most recent version of this Manual on the Residential Light Fixtures Partner Resources page on the ENERGY STAR website.

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

Schedule Requirements:

The manufacturer must retain a qualified third-party testing lab within fourteen (14) 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. For fixtures, testing on the first sample must be completed within 311 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 platforms or lamps, testing on all ten samples must be completed within 311 days of initial notification by EPA.

For fixtures, if more than one sample fails to meet the same performance parameter of the ENERGY STAR specification, the fixture will be addressed under EPA's delisting protocol. For platforms or replacement lamps, if more than two out of ten samples fail to meet the same performance parameter of the ENERGY STAR specification, the platform or replacement lamps will be addressed under EPA's *Standard Operating Procedure (SOP) for Underperforming Components (Lamps, Ballasts, or Drivers)*.

**Note:** EPA will select no more than two (2) fixtures, lamp ballast platforms or replacement lamps from any given manufacturer per year. Having selected the platform or replacement lamp, EPA will then proceed with testing one specific fixture that contains each platform or replacement lamp; or initiate the Quality Assurance process on the items.

- 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 (7) 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

- 6) **Effective Date:** The ENERGY STAR Version 4.2 Eligibility Criteria (a.k.a. Specification) for Residential Light Fixtures, which represents the addition of test procedures and performance metrics for LED-based fixtures shall go into effect on June 2, 2008. **Note: as previously announced, requirements specific to GU-24 based integrated lamps and the fixtures employing them take effect on August 1, 2008.**

- A. Qualifying and Labeling Products under the Version 4.2 Specification: All products, including models originally qualified under Versions 4.0 or 4.1 with a **date of manufacture** on or after **June 2, 2008**, must meet the new Version 4.2 requirements in order to use the ENERGY STAR mark on the product, in product literature, on Partner promotional materials, on the Partner's website, or through Partner sales channels. (Note: products qualified under Version 4.1 automatically qualify under Version 4.2.) The date of manufacture is specific to each unit and is the date (i.e., month and year) on which a unit is considered to be completely assembled.
  - B. Elimination of Automatic Grandfathering: EPA does not allow grandfathering under this Version 4.2 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.

While this document currently refers to test procedures for fluorescent and compact fluorescent technologies, as new technologies emerge that have equal or better performance to the levels proposed here, consistent with a technology neutral approach, EPA may amend the program requirements by adding additional test procedures.

**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 a fixture to remain ENERGY STAR qualified. New test data may be required for new, revised and/or existing ENERGY STAR performance characteristics.

**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><b>System Efficacy<sup>2</sup></b>  <i>Per Lamp Ballast Platform in Lumens Per Watt (LPW)</i></p>	<p>≥ 50 LPW for all lamp types below 30 total listed lamp watts.  ≥ 60 LPW for all lamp types that are ≤ 24 inches and ≥ 30 total listed lamp watts.  ≥ 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><b>Provide:</b></p> <ol style="list-style-type: none"> <li>a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>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>EPA-approved documentation from an industry association, such as the NEMA/ALA matrices.</li> </ol> <p><b>Sample Size:</b> ≥ 3 lamp/ballast combination samples must be tested.</p> <p><b>Passing Test:</b> Two of the three samples must pass in order to qualify for ENERGY STAR.</p> <p><b>Conditions:</b> [1], [2]</p>
<p><b>Lamp Requirements:</b></p>			
<p><b>Lamp Life</b></p>	<p>For lamps shipped with the fixtures, the average rated life of the lamp must be ≥ 10,000 hours.  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><b>Provide:</b></p> <ol style="list-style-type: none"> <li>a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>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>EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or</li> <li>a test report from an ISO 9000 registered facility.</li> </ol> <p><b>Sample Size:</b> ≥ 10 lamps must be tested.</p> <p><b>Passing Test:</b> 50% of the sample set must be functioning at the lifetime requirement in order to qualify for ENERGY STAR.</p> <p><b>Conditions:</b> [2], [3], [4]</p>

<sup>2</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.

**Table 1: Indoor Fixtures**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
<b>Lumen Maintenance</b>	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><b>Provide:</b></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><b>Sample Size:</b> ≥ 10 lamps must be tested.</p> <p><b>Passing Test:</b> ≥ 80% of the samples must achieve the required lumen maintenance value in order to qualify for ENERGY STAR.</p> <p><b>Conditions:</b> [3]</p>
<b>Color Rendering Index</b>	<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><b>Provide:</b></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>Sample Size:</b> ≥ 10 lamps must be tested.</p> <p><b>Passing Test:</b> ≥ 80% of the samples must achieve the required color rendering index value in order to qualify for ENERGY STAR.</p> <p><b>Conditions:</b> [2], [3]</p>

**Table 1: Indoor Fixtures**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
<p><b>Correlated Color Temperature</b></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><b>Provide:</b></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><b>Sample Size:</b> ≥ 10 lamps must be tested.</p> <p><b>Passing Test:</b> ≥ 90% of the lamps tested fall within a 7-step ANSI Mac Adam ellipse for the designated CCT in order to qualify for ENERGY STAR.</p> <p><b>Conditions:</b> [3], [5]</p>

**Table 1: Indoor Fixtures**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
<p><b>Lamp/ Lampholder Compatibility</b></p>	<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 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. Specific lamp characteristics that should be included in the lamp specification sheet are detailed in the Required Documentation column.</li> </ul>	<p><u>Lamp Base Configuration:</u> ANSI C81.61; IEC 60061-1</p> <p><u>Lamps Compliant with an ANSI-IEC Standard (for lamp dimensions and electrical parameters):</u> ANSI C78.901-2001; ANSI C78.81-2001; IEC 60901; IEC 60081</p> <p><u>Lamps Not Compliant with an ANSI-IEC Standard (for lamp dimensions and electrical parameters):</u> 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><u>Lamp Base Configuration:</u> Provide manufacturer data indicating the lamp base type used.</p> <p><u>Lamps Compliant with an ANSI-IEC Standard (for lamp dimensions and electrical parameters):</u> Provide manufacturer data indicating applicable ANSI-IEC lamp data sheet number.</p> <p><u>Lamps Not Compliant with an ANSI-IEC Standard (for lamp dimensions and electrical parameters):</u> Provide a manufacturer lamp specification sheet that describes 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>1. 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>2. Dimensional Characteristics, including diagram</li> <li>3. 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>

ENERGY STAR Program Requirements for Residential Light Fixtures: Version 4.2 – ANNEX A

**Table 1: Indoor Fixtures**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
<b>Lamp Labeling Requirement</b>	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)	<b>Provide:</b> 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>			
<b>General</b>	Per ANSI C82.11 Section 5 except paragraph 5.3.1.	ANSI C82.11	No supplemental documentation is required.
<b>Lamp Start Time</b>	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><b>Provide:</b></p> <ol style="list-style-type: none"> <li>a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>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>EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or</li> <li>a test report from an OSHA NRTL laboratory.</li> </ol> <p><b>Sample Size:</b> ≥ 3 lamp/ballast combination samples must be tested.</p> <p><b>Passing Test:</b> Two of the three samples must pass in order to qualify for ENERGY STAR.</p> <p><b>Conditions:</b> [1]</p>
<b>Power Factor</b>	≥ 0.5	ANSI C82.11-3.3.1	<p><b>Provide:</b></p> <ol style="list-style-type: none"> <li>a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>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>EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or</li> <li>a test report from the manufacturer</li> </ol> <p><b>Sample Size:</b> ≥ 3 ballast samples must be tested.</p> <p><b>Passing Test:</b> Two of the three samples must pass in order to qualify for ENERGY STAR.</p> <p><b>Conditions:</b> [6]</p>

**Table 1: Indoor Fixtures**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
Lamp Current Crest Factor	$\leq 1.7$	ANSI C82.11-3.3.3 and 5.6 ANSI C82.1-5.6.1	<p><b>Provide:</b></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 OSHA NRTL laboratory.</li> </ol> <p><b>Sample Size:</b> <math>\geq 3</math> ballast samples must be tested.</p> <p><b>Passing Test:</b> Two of the three samples must pass in order to qualify for ENERGY STAR.</p> <p><b>Conditions:</b> [6]</p>



**Table 1: Indoor Fixtures**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
<p><b>Maximum Measured Ballast Case Temperature During Normal Operation Inside Fixture(s)</b></p>	<p>Not 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>-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><b>Provide:</b> A Temperature Test Report containing <u>all</u> of the following information:</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>The test report may be 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 or ballast manufacturer.</li> </ol> <p><b>Sample Size:</b> 1 fixture must be tested.</p> <p><b>Passing Test:</b> Measured temperature at the appropriate ballast case test point must be less than the manufacturer recommended maximum.</p> <p><b>Conditions:</b> 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.</p>
<p><b>Electromagnetic and Radio Frequency Interference</b></p>	<p>Ballast must meet FCC requirements for consumer use (FCC 47 CFR Part 18 Consumer Emission Limits).</p>	<p>Consumer Limits Per FCC 47 CFR Part 18.305 and 18.307</p>	<p><b>Provide:</b> No supplemental documentation required.</p>

ENERGY STAR Program Requirements for Residential Light Fixtures: Version 4.2 – ANNEX A

**Table 1: Indoor Fixtures**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
<b>Ballast Frequency</b>	20 to 33 kHz or $\geq 40$ kHz	Oscilloscope instruction manual	<p><b>Provide:</b></p> <ol style="list-style-type: none"> <li>a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>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>EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or</li> <li>a test report from the manufacturer</li> </ol> <p><b>Sample Size:</b> <math>\geq 3</math> ballast samples must be tested.</p> <p><b>Passing Test:</b> Two of the three samples must pass in order to qualify for ENERGY STAR.</p> <p><b>Conditions:</b> [6]</p>
<b>Transient Protection</b>	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	<p><b>Provide:</b></p> <ol style="list-style-type: none"> <li>a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>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>EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or</li> <li>a test report from the manufacturer</li> </ol> <p><b>Sample Size:</b> <math>\geq 3</math> ballast samples must be tested.</p> <p><b>Passing Test:</b> <u>All</u> samples must pass in order to qualify for ENERGY STAR.</p> <p><b>Conditions:</b> [6]</p>

**Table 1: Indoor Fixtures**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
<b>End of Life Protection</b>	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.	IEC 61347-2-3 Amendment 1 to Edition 1 2004-06 (or ANSI C82.11-2005, upon its release)	<p><b>Provide:</b>  <u>For all ballasts that that operate T4 and/or T5 sized lamps</u>, 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><u>For all ballasts that operate T3 and smaller sized lamps</u>, 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> <p><b>Sample Size:</b> ≥ 1 ballast sample must be tested.</p> <p><b>Passing Test:</b> All samples must pass in order to qualify for ENERGY STAR.</p> <p><b>Conditions:</b> [6]</p>
<b>Dimming</b>	<p>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.</p> <p>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.</p>	No Standard Available (Use manufacturer protocol)	<p><b>Provide:</b>                      A laboratory test report proving the fixture is dimmable from 100% to 30% must be submitted upon EPA request.</p>
<b>Safety - Ballasts and “Non-Edison base Fluorescent Adapters”</b>	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	<p><b>Provide:</b>                      A cover page of a safety test report or a general coverage statement from an OSHA NRTL laboratory.</p>

ENERGY STAR Program Requirements for Residential Light Fixtures: Version 4.2 – ANNEX A

**Table 1: Indoor Fixtures**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
<b>Fixture Requirements:</b>			
<b>Fixture Warranty</b>	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)	<b>Provide:</b> A copy of the actual two-year fixture manufacturer written warranty that is included with product packaging.
<b>Noise</b>	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.	<b>Provide:</b> Test report upon EPA request.
<b>Lamp Shipment Requirement</b>	All indoor fixtures must be shipped with a lamp, except for the following fluorescent fixture types: 1. Recessed downlight fixtures and recessed downlight retrofit kits 2. Fixtures using linear fluorescent lamps	No Standard Available (Use manufacturer protocol)	None
<b>Replaceable Ballast</b>	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 fixture is attached.	No Standard Available (Use manufacturer protocol)	<b>Provide:</b> 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.”
<b>Safety - Portable Fixtures</b>	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	<b>Provide:</b> The cover page of a safety test report or a general coverage statement from an OSHA NRTL laboratory.

ENERGY STAR Program Requirements for Residential Light Fixtures: Version 4.2 – ANNEX A

**Table 1: Indoor Fixtures**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
<b>Safety - Hardwired Fixtures</b>	The cover page of a safety test report or a general coverage statement must be provided to demonstrate compliance with UL 1598.	UL 1598	<b>Provide:</b> The cover page of a safety test report or a general coverage statement from an OSHA NRTL laboratory.
<b>Recessed Downlight Fixtures-Insulation Contact (IC)-Rated</b>	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.	Approved for zero clearance insulation cover (IC) by an OSHA NRTL laboratory	None
<b>Recessed Downlight Fixtures-Air Tight For Restricted Air Movement</b>	<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 ASTM E283. The label must be clearly visible to a building inspector.</li> </ol>	ASTM E283	None

**Table 1: Indoor Fixtures**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
	<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><b>Product Packaging for Consumer Awareness Requirements</b></p>	<p>For fixtures that are not shipped with lamps, product packaging must include a list of lamps 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. <b>Note: only recessed downlight fixtures, recessed downlight retrofit kits, and fixtures using linear lamps may ship without a lamp.</b></p> <p>For fixtures that are shipped with lamps, product packaging language is required that clearly describes the</p>	<p>No Standard Available (Use manufacturer protocol)</p>	<p><b>Provide:</b> 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>

ENERGY STAR Program Requirements for Residential Light Fixtures: Version 4.2 – ANNEX A

**Table 1: Indoor Fixtures**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
	<p>nominal color designation of the lamp in units of Kelvin (i.e., 2700K, 3000K, 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
<p><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.</p>			
<p><b>Combined Lamp &amp; Ballast Requirements:</b></p>			
Reflectors	Reflectors must be included to maximize fixture efficiency.	No Standard Available (Use manufacturer protocol)	No supplemental documentation required.

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

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
Aperture	Maximum 7.0"	No Standard Available (Use manufacturer protocol)	No supplemental documentation required.
Air Tight For Restricted Air Movement	<p>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 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 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</li> </ol>	ASTM E283	<p><b>Provide:</b> 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> <p><b>Sample Size:</b> ≥ 1 sample must be tested.</p> <p><b>Passing Test:</b> The sample tested must meet the requirement.</p> <p><b>Conditions:</b> [12]</p>



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

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
	<p>airtight trim kits are designed to be installed with the luminaire housing.</p>		
<p>Electrical Connections</p>	<p>Edison lamp socket with wire “pigtail” to the ballast.</p>	<p>No Standard Available (Use manufacturer protocol)</p>	<p><b>Provide:</b> An engineering description and/or schematic.</p>
<p>Safety – Fixture Conversions, Retrofits</p>	<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>	<p>UL 1598 and UL 1598B</p>	<p><b>Provide:</b> The cover page of a safety test report or a general coverage statement from an OSHA NRTL laboratory.</p>
<p>Product Packaging for Consumer Awareness Requirements</p>	<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 retrofit kits are compatible with.</li> <li>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.</li> <li>3. Any known incompatibility with photo controls, dimmers or timing devices.</li> <li>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.”</li> </ol>	<p>No Standard Available (Use manufacturer protocol)</p>	<p><b>Provide:</b> 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>

**Table 2A: Outdoor Fixtures: Compliance Through Efficient Light Source**

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><b>System Efficacy</b></p> <p><i>Per Lamp Ballast Platform in Lumens Per Watt (LPW)</i></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><b>Provide:</b></p> <ol style="list-style-type: none"> <li>a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>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>EPA-approved documentation from an industry association, such as the NEMA/ALA matrices.</li> </ol> <p><b>Sample Size:</b> ≥ 3 lamp/ballast combination samples must be tested.</p> <p><b>Passing Test:</b> Two of the three samples must pass in order to qualify for ENERGY STAR.</p> <p><b>Conditions:</b> [1], [2]</p>
<p><b>Lamp Requirements:</b></p>			
<p><b>Lamp Life</b></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><b>Provide:</b></p> <ol style="list-style-type: none"> <li>a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>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>EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or</li> <li>a test report from an ISO 9000 registered facility.</li> </ol> <p><b>Sample Size:</b> ≥ 10 lamps must be tested.</p> <p><b>Passing Test:</b> 50% of the sample set must be functioning at the lifetime requirement in order to qualify for ENERGY STAR.</p> <p><b>Conditions:</b> [2], [3], [4]</p>

**Table 2A: Outdoor Fixtures: Compliance Through Efficient Light Source**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
<p><b>Lamp/Lampholder Compatibility</b></p>	<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 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. Specific lamp and lamp base characteristics that should be included in the lamp specification sheet are detailed in the Required Documentation column.</li> </ul>	<p><u>Lamp Base Configuration:</u> ANSI C81.61; IEC 60061-1</p> <p><u>Lamps Compliant with an ANSI-IEC Standard (for lamp dimensions and electrical parameters):</u> ANSI C78.901-2001; ANSI C78.81-2001; IEC 60901; IEC 60081</p> <p><u>Lamps Not Compliant with an ANSI-IEC Standard (for lamp dimensions and electrical parameters):</u> 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><u>Lamp Base Configuration:</u> Provide manufacturer data indicating the lamp base type used.</p> <p><u>Lamps Compliant with an ANSI-IEC Standard (for lamp dimensions and electrical parameters):</u> Provide manufacturer data indicating applicable ANSI-IEC lamp data sheet number.</p> <p><u>Lamps Not Compliant with an ANSI-IEC Standard (for lamp dimensions and electrical parameters):</u> Provide a manufacturer lamp specification sheet that describes 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>			
<p><b>Electromagnetic and Radio Frequency Interference</b></p>	<p>Ballast must be FCC rated for consumer use (FCC 47 CFR Part 18 Consumer Emission Limits).</p>	<p>Consumer Limits Per FCC 47 CFR Part 18.305 and 18.307</p>	<p><b>Provide:</b> No supplemental documentation required.</p>

**Table 2A: Outdoor Fixtures: Compliance Through Efficient Light Source**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
<b>End of Life (EOL) Protection</b>	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 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.	IEC 61347-2-3 Amendment 1 to Edition 1 2004-06 (or ANSI C82.11-2005, upon its release)	<p><b>Provide:</b>  <u>For all ballasts that that operate T4 and/or T5 sized lamps</u>, 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><u>For all ballasts that operate T3 and smaller sized lamps</u>, 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> <p><b>Sample Size:</b> ≥ 1 ballast sample must be tested.</p> <p><b>Passing Test:</b> All samples must pass in order to qualify for ENERGY STAR.</p> <p><b>Conditions:</b> [6]</p>
<b>Fixture Requirements:</b>			
<b>Maximum Input Power</b>	150 watts		
<b>Automatic Daylight Shutoff</b>	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)	<p><b>Provide:</b>  Applicable sections of fixture manual(s) that demonstrate controls exist for each fixture being submitted.</p> <p><b>Conditions:</b> [6]</p>
<b>Fixture Warranty</b>	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)	<p><b>Provide:</b>  A copy of the actual two-year fixture manufacturer written warranty that is included with product packaging.</p>

**Table 2A: Outdoor Fixtures: Compliance Through Efficient Light Source**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
<b>Replaceable Ballast</b>	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)	<b>Provide:</b> 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.”
<b>Safety</b>	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)	<b>Provide:</b> 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.

**Table 2A: Outdoor Fixtures: Compliance Through Efficient Light Source**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
<p><b>Product Packaging for Consumer Awareness Requirements</b></p>	<p><u>For fixtures that are not shipped with lamps</u>, 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 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.”</p>	<p>No Standard Available (Use manufacturer protocol)</p>	<p><b>Provide:</b> 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>

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

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
<p><b>Note:</b> All lamp types (fluorescent, incandescent, etc.) may be used to meet the requirements set forth in this table.</p>			
<p><b>Fixture Requirements:</b></p>			
<p><b>Maximum Input Power</b></p>	<p>250 watts</p>		
<p><b>Automatic Daylight Shutoff</b></p>	<p>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.</p>	<p>No Standard Available (Use manufacturer protocol)</p>	<p><b>Provide:</b> Applicable sections of fixture manual(s) that demonstrate controls exist for each fixture being submitted.</p> <p><b>Conditions:</b> [6]</p>
<p><b>Motion Control</b></p>	<p>The fixture must contain an integrated motion sensor that employs infrared sensing technology. The sensor must:</p> <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 operation.</li> </ul> <p>The fixture must:</p> <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>	<p>No Standard Available (Use manufacturer protocol)</p>	<p><b>Provide:</b> Applicable sections of fixture manual(s) that demonstrate controls exist for each fixture being submitted.</p> <p><b>Conditions:</b> [6]</p>
<p><b>Fixture Warranty</b></p>	<p>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.</p>	<p>No Standard Available (Use manufacturer protocol)</p>	<p><b>Provide:</b> A copy of the actual two-year fixture manufacturer written warranty that is included with product packaging.</p>

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

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
<b>Replaceable Ballast</b>	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)	<b>Provide:</b> 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.”
<b>Safety</b>	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)	<b>Provide:</b> 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.



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

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
<p><b>Product Packaging for Consumer Awareness Requirements</b></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, 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.”</p> <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>	<p>No Standard Available (Use manufacturer protocol)</p>	<p><b>Provide:</b> 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>

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

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
<b>Note:</b> These requirements supersede requirements in preceding tables, only for fixtures using GU-24 based integrated lamps.			
<b>System Efficacy</b> <sup>3</sup>  <i>Per Integrated Lamp in Lumens Per Watt (LPW)</i>	<u>Bare Lamps:</u> ≥ 50 LPW for all lamp types below 30 total listed lamp watts.  ≥ 60 LPW for all lamp types that are ≥ 30 total listed lamp watts.  <u>Covered, Reflector, and Dimmable Lamps:</u> ≥ 40 LPW for all lamp types and wattages	LM-66-00; ANSI C78.5	<b>Provide:</b> <ol style="list-style-type: none"> <li>a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>EPA-approved documentation from an industry association.</li> </ol> <b>Sample Size:</b> ≥ 10 samples must be tested for each testing orientation selected for the submittal.  <b>Passing Test:</b> ≥ 80% of the samples must achieve the required System Efficacy value.  <b>Conditions:</b> [2]
<b>Average Rated Lamp Life</b>	<u>Bare Lamps:</u> The average rated life of the lamp must be ≥ 10,000 hours.  <u>Covered, Reflector, and Dimmable Lamps:</u> The average rated life of the lamp must be ≥ 8,000 hours.	IESNA LM-65-01; ANSI C78.5	<b>Provide:</b> <ol style="list-style-type: none"> <li>a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>EPA-approved documentation from an industry association; or</li> <li>a test report from an ISO 9000 registered facility.</li> </ol> <b>Sample Size:</b> ≥ 10 samples must be tested for each testing orientation selected for the submittal.  <b>Passing Test:</b> ≥ 50% of the samples must be functioning at the lifetime requirement.  <b>Conditions:</b> [2], [9]
<b>1,000-hour Lumen Maintenance</b>	Must be greater than 90.0% of initial (100-hour) lumen output at 1,000 hours of rated life.	IESNA LM-65-01; IESNA LM-66-00; ANSI C78.5 Section 4.10	<b>Provide:</b> <ol style="list-style-type: none"> <li>a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>EPA-approved documentation from an industry association; or</li> </ol>

<sup>3</sup> Take performance and electrical measurements at the end of the 100-hour aging period according to ANSI C78.5. The lamp efficacy shall be the average of the total sample size for each testing orientation selected for the submittal. Use wattages placed on packaging, not measured wattage, to select proper efficacy category in this table.

Efficacies are based on measured values for lumens and wattages from pertinent test data. Wattages and lumens placed on packages may not be used in calculation and are not governed by this criterion.

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

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
<b>Lumen Maintenance at 40% of Rated Life</b>	Must be greater than 80.0% of initial (100-hour) lumen output at 40% of rated life.		<p>1. a test report from an ISO 9000 registered facility.</p> <p><b>Sample Size:</b> ≥ 10 samples must be tested for each Testing Orientation selected for the submittal.</p> <p><b>Passing Test:</b> ≥ 80% of the samples must achieve the required lumen maintenance value.</p> <p><b>Conditions:</b> [2], [10]</p>
<b>Accelerated Cycling, Thermal, and Voltage (ACTV) stress test</b>	GU-24 must remain functional for 2,880 cycles @ 60°C or 720 cycles at 80 °C	Lighting Research Center (LRC) Test Method	<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 process is underway.</b></p> <p><b>Sample Size:</b> 5 <del>or</del> 10 samples must be tested for each testing orientation selected for the submittal.</p> <p><b>Passing Test:</b> If a sample size of 5 is chosen, then ALL 5 samples must remain functional for the duration of the test. If a sample size of 10 is used then 1 sample failure is permitted.</p>
<b>Color Rendering Index</b>	≥ 80	IESNA LM-58; CIE 13.3	<p><b>Provide:</b></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. EPA-approved documentation from an industry association.</li> </ol> <p><b>Sample Size:</b> ≥ 10 samples must be tested for each testing orientation selected for the submittal.</p> <p><b>Passing Test:</b> ≥ 80% of the samples must achieve the required color rendering index value.</p> <p><b>Conditions:</b> [2]</p>

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

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
<b>Correlated Color Temperature</b>	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>Provide:</b></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. EPA-approved documentation from an industry association; or</li> <li>3. a test report from an ISO 9000 registered facility.</li> </ol> <p><b>Sample Size:</b> ≥ 10 samples must be tested for each testing orientation selected for the submittal.</p> <p><b>Passing Test:</b> ≥ 90% of the samples tested fall within a 7-step ANSI Mac Adam ellipse for the designated CCT.</p> <p><b>Conditions:</b> [5]</p>
<b>Lamp Base</b>	Lamp Base configuration must utilize the GU-24 base.	For details see: <a href="http://www.lrc.rpi.edu/gu-24.asp">http://www.lrc.rpi.edu/gu-24.asp</a> (or ANSI GU-24 standard, upon its release)	No supplemental documentation is required.
<b>Maximum Mercury Content</b>	<p><u>GU-24 Based Integrated Lamps less than 25 watts:</u> ≤ 5 milligrams (mg) per lamp</p> <p><u>GU-24 Based Integrated Lamps 25 to 40 watts:</u> ≤ 6 milligrams (mg) per lamp</p> <p>Partners must ensure that GU-24 based integrated lamps are listed with NEMA. Lamp manufacturers of GU-24 based integrated lamps seeking Platform Letters of Approval are responsible for listing lamps with NEMA.</p>	<p>NEMA Voluntary Industry Commitment to Limit Mercury Content in Self-Ballasted CFLs Sold in the U.S.</p> <p><a href="http://www.cfl-mercury.org">www.cfl-mercury.org</a></p>	<p><b>Provide:</b></p> <p>Reference to lamp manufacturer's commitment form on file with NEMA. In addition, the product may not be present on the manufacturer's list of non-conforming products.</p>

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

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
<p><b>Labeling for Replacement GU-24 Lamps</b></p> <p><i>(language printed on integrated lamp base)</i></p>	<p><u>Required lamp labeling language for consumer replacement must include a manufacturer designation that encompasses the following:</u></p> <ul style="list-style-type: none"> <li>• lamp manufacturer name</li> <li>• lamp wattage</li> <li>• correlated color temperature</li> <li>• color rendering index</li> </ul> <p>Additional packaging requirements for mercury content are included in the <b>Product Packaging and Lamp Labeling for Consumer Awareness Requirements</b>, below.</p>	<p>No Standard Available (Use manufacturer protocol – optionally, manufacturer may use the NEMA or ANSI generic lamp description).</p>	<p><b>Provide:</b> A copy of the actual language that is included on the base of the GU-24 product.</p>
<p><b>General Ballast Requirement</b></p>	<p>Integrated lamps are required to meet the general requirement of ANSI C78.5, in addition to the specific requirements listed below.</p>	<p>ANSI C78.5</p>	<p>No supplemental documentation is required.</p>
<p><b>Lamp Start Time</b></p>	<p>The time needed after switching on the lamp to start continuously and remain illuminated must be one second or less.</p>	<p>ANSI C78.5 Section 4.7, for test conditions and methodology</p>	<p><b>Provide:</b></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. EPA-approved documentation from an industry association; or</li> <li>3. a test report from an OSHA NRTL laboratory.</li> </ol> <p><b>Sample Size:</b> ≥ 10 samples must be tested for each testing orientation selected for the submittal.</p> <p><b>Passing Test:</b> ≥ 80% of the samples tested must meet the required lamp start time.</p>
<p><b>Run-up Time</b></p>	<p><u>Non-amalgam:</u> Average of 10 samples tested must be less than 1.0 minute per ANSI C78.5, Section 3.11 and 4.8.</p> <hr/> <p><u>Amalgam:</u> Average of 10 samples tested must be less than 3.0 minutes per ANSI C78.5, clause 3.11 and 4.8.</p>	<p>ANSI C78.5, Section 3.11 and 4.8</p>	<p><b>Provide:</b></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. EPA-approved documentation from an industry association.</li> </ol> <p><b>Sample Size:</b> ≥ 10 samples must be tested for each testing orientation selected for the submittal.</p> <p><b>Passing Test:</b> ≥ 80% of the samples tested must achieve the required run-up time.</p> <p><b>Conditions:</b> [2], [11]</p>

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

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
<b>Power Factor</b>	≥ 0.50	ANSI C82.11-3.3.1	<p><b>Provide:</b></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. EPA-approved documentation from an industry association; or</li> <li>3. a test report from the manufacturer.</li> </ol> <p><b>Sample Size:</b> ≥ 10 samples must be tested.</p> <p><b>Passing Test:</b> ≥ 80% of the samples tested must achieve the required power factor.</p>
<b>Electromagnetic and Radio Frequency Interference</b>	Integrated Lamp must meet FCC requirements for consumer use, FCC 47 CFR Part 2 (Equipment Authorization) and Part 18 (Consumer Emission Limits)	FCC 47 CFR Part 2 and Part 18	<p><b>Provide:</b></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. EPA-approved documentation from an industry association; or</li> <li>3. a test report from the manufacturer.</li> </ol> <p><b>Sample Size:</b> 1 sample must be tested.</p> <p><b>Passing Test:</b> The sample tested must meet the requirement.</p>
<b>Ballast Frequency</b>	20 to 33 kHz or ≥ 40 kHz	Oscilloscope instruction manual	<p><b>Provide:</b></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. EPA-approved documentation from an industry association; or</li> <li>3. a test report from the manufacturer.</li> </ol> <p><b>Sample Size:</b> ≥ 10 samples must be tested.</p> <p><b>Passing Test:</b> ≥ 80% of the samples tested must achieve the required ballast frequency.</p>
<b>Transient Protection</b>	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	<p><b>Provide:</b></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. EPA-approved documentation from an industry association; or</li> <li>3. a test report from the manufacturer.</li> </ol> <p><b>Sample Size:</b> ≥ 5 samples must be tested.</p> <p><b>Passing Test:</b> ≥ 90% of the samples tested must meet the 7 strike test requirement.</p>

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

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
<b>End of Life Protection</b>	All integrated lamps sized T5 and smaller must provide end-of-life protection either in the ballast or the discharge tube itself.	<p>Applicable portions of IEC 61347-2-3 Amendment 1 to Edition 1 2004-06 or alternate EPA-approved standard</p> <p>(Note that upon the inclusion of integrated CFL lamps in published UL1993 standards, EPA will likely approve this standard for use as a reference)</p>	<p><b>Provide:</b>  <u>For all T4 and/or T5 sized integrated lamps</u>, demonstrate that the integrated lamp 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. EPA-approved documentation from an industry association; or</li> <li>3. a test report from the manufacturer.</li> </ol> <p><u>For T3 and smaller sized integrated lamps</u>, provide from the integrated lamp manufacturer a circuit diagram and an accompanying engineering description outlining the scheme that is used to achieve the end of life function within the integrated lamp.</p> <p><u>For all lamps, upon release of UL 1993 2<sup>nd</sup> Edition:</u> A cover page of a safety test report or a general coverage statement from an OSHA NRTL laboratory demonstrating that the integrated lamp is in compliance UL 1993 End of Life testing requirements.</p> <p><b>Sample Size (for T4 or T5):</b> ≥ 3 samples must be tested.</p> <p><b>Passing Test (for T4 or T5):</b> All samples must pass.</p>
<b>Safety</b>	Product must comply with the most current revision of UL1993	UL 1993 (most current revision)	<p><b>Provide:</b>            File number for the respective product as listed by the appropriate OSHA NRTL laboratory and one of the following:</p> <ol style="list-style-type: none"> <li>1. Letter or statement from an OSHA NRTL facility indicating that the product meets the requirements of the most current revision of UL1993.</li> <li>2. Web Link to the manufacturer's listed product at the OSHA NRTL laboratory that carried out the safety tests.</li> <li>3. Print out of the OSHA NRTL website showing the listed product.</li> </ol>

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

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
<b>Testing Orientation</b>	When applying for Platform Letters of Approval, GU-24 manufacturers must declare the orientation used for each of the following requirements: <ol style="list-style-type: none"> <li>1. System Efficacy</li> <li>2. Average Rated Lamp Life</li> <li>3. 1,000-hour Lumen Maintenance</li> <li>4. Lumen Maintenance at 40% of Rated Life</li> <li>5. ACTV Test</li> <li>6. Color Rendering Index</li> <li>7. Correlated Color Temperature</li> <li>8. Lamp Start Time</li> <li>9. Run-up Time</li> </ol>	The following options will be presented on Platform Letters of Approval: <ol style="list-style-type: none"> <li>1. Base Up</li> <li>2. Base Down</li> <li>3. 50% Base Up, 50% Base Down</li> <li>4. Horizontal Operation</li> </ol>	<p><b>Provide:</b> No supplemental documentation required, but a response is mandatory when submitting a product.</p> <p><b>Conditions:</b> [7]</p>
<b>Lamp Warranty</b>	Warranty or limited warranty statement must cover at least a minimum of 24 months, or 2 years, from date of purchase based on no less than 3 hour per day of use.	No Standard Available (Use manufacturer protocol)	<p><b>Provide:</b> A copy of the actual two-year manufacturer written warranty.</p>



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

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
<p><b>Product Packaging and Lamp Labeling for Consumer Awareness Requirements</b></p>	<p><u>Required lamp labeling language for mercury content must include one (1) of the following :</u></p> <ul style="list-style-type: none"> <li>• the symbol “Hg” within a circle</li> <li>• “Contains Mercury”</li> </ul> <p>Additional information may also be printed as required by applicable state laws.</p> <p><u>Required fixture and fixture packaging language for mercury content must include the following:</u></p> <ul style="list-style-type: none"> <li>• <a href="http://www.epa.gov/bulbrecycling">www.epa.gov/bulbrecycling</a></li> </ul> <p>Alternatively, <a href="http://www.lamprecycle.org">www.lamprecycle.org</a> may be printed in place of <a href="http://www.epa.gov/bulbrecycling">www.epa.gov/bulbrecycling</a> , so long as a prominent hyperlink to the EPA's web site is maintained on the alternate's home page.</p> <p><u>Required lamp product packaging language for mercury content when lamp is not included with a light fixture must include the following:</u></p> <ul style="list-style-type: none"> <li>• the symbol “Hg” within a circle</li> <li>• “Contains Mercury”</li> <li>• <a href="http://www.epa.gov/bulbrecycling">www.epa.gov/bulbrecycling</a></li> </ul> <p>Alternatively, <a href="http://www.lamprecycle.org">www.lamprecycle.org</a> may be printed in place of <a href="http://www.epa.gov/bulbrecycling">www.epa.gov/bulbrecycling</a> , so long as a prominent hyperlink to the EPA's web site is maintained on the alternate's home page.</p>	<p>No Standard Available (Use manufacturer protocol)</p>	<p><b>Provide:</b> A written copy or a PDF graphic of the language that will be displayed on lamps and product packaging.</p>

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

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
	<p><u>Required lamp product packaging language for warranty when lamp is not included with a light fixture:</u></p> <p>Product packaging must state "Warranty" or "Limited Warranty" and have one of the following for consumer complaint resolution (as applicable):</p> <ul style="list-style-type: none"> <li>• A company phone number; or</li> <li>• mailing address; or</li> <li>• web site address.</li> </ul>	<p>No Standard Available (Use manufacturer protocol)</p>	
	<p><u>Required lamp product packaging language for FTC labeling requirements when lamp is not included with a light fixture:</u></p> <p>ENERGY STAR qualified compact fluorescent lamps and lamp systems must comply with the labeling requirements of the U.S. Federal Trade Commission Packaging Laws - FTC 16CFR Part 305.1-.19.</p>	<p>FTC 16CFR Part 305.1-.19</p>	
	<p><u>Required lamp product packaging language for starting temperature when lamp is not included with a light fixture:</u></p> <p>Package must state the minimum starting temperatures or geographic zone of use and any other conditions for reliable starting to meet the starting time requirements of ANSI C78.5, clause 4.8.</p>	<p>ANSI C78.5 clause 4.8</p>	
	<p><u>Required lamp product packaging language for control compatibility when lamp is not included with a light fixture:</u></p> <p>Lamp package must clearly state any known incompatibility with photo controls, dimmers or timing devices. In addition, packaging should state specific application exceptions.</p>	<p>No Standard Available (Use manufacturer protocol)</p>	

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

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards	Required Documentation
	<p><u>Packaging language requirement:</u></p> <p>Packaging and lamp labeling language must be in English or English with additional languages.</p> <p>For products that will be sold in Canada, packaging must include both English &amp; French.</p>	<p>No Standard Available (Use manufacturer protocol)</p>	

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ENERGY STAR Program Requirements for Residential Light Fixtures: Version 4.2 – ANNEX A

**Table 4 – Indoor & Outdoor Fixtures Employing LED Light Engines for Primary Illumination**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards
<b>Note:</b> These requirements apply only to fixtures to be qualified using LED light engines. Recessed canister fixtures using LED Light Engines are not eligible to earn the ENERGY STAR using these test procedures.		
<b>LED Light Engine Requirements</b>		
<b>LED Light Engine Efficacy</b>  <i>Per LED light engine in lumens per watt (LPW)</i>	<p>≥ 50 LPW for uncovered LED light engines</p> <p>≥ 40 LPM for covered LED light engines (engines featuring integral secondary optics)</p>	<i>ASSIST Recommends: Recommendations for Testing and Evaluating White LED Light Engines and Integrated LED Lamps Used in Decorative Lighting Luminaires. Vol 4, Issue 1, May 2008. (ASSIST, May 2008)</i> <sup>1, 2</sup>
<b>LED Light Engine Color Rendering Index (CRI)</b>  <i>Required for indoor fixtures only.</i>	≥ 75	ASSIST, May 2008; ANSI C78.377-2008
<b>LED Light Engine Correlated Color Temperature (CCT)</b>  <i>Required for indoor fixtures only.</i>	Light output must meet one of the following nominal correlated color temperature (CCT) values: 2700K, 3000K, 3500K, 4000K, 4500K, 5000K, 5700K, 6500K.	ASSIST, May 2008; ANSI C78.377-2008
<b>LED Light Engine Maximum Measured Driver/Driver Case Temperature (During <i>in situ</i> Operation)</b>	<p>T<sub>c</sub> not to exceed the LED driver manufacturer maximum recommended case temperature when measured during <i>in situ</i> operation.</p> <p>Note: This performance characteristic is separate and distinct from safety requirements.</p>	ASSIST, May 2008 (See page 8)
<b>Lumen Maintenance</b>	<p><b>Indoor fixtures:</b> ≥ 25,000 hours to 70% Lumen Maintenance (L<sub>70</sub>)</p> <p><b>Outdoor fixtures:</b> ≥ 35,000 hours to 70% Lumen Maintenance (L<sub>70</sub>)</p>	<i>ASSIST Recommends: LED Life for General Lighting Vol. 1, February 2005, rev. August 2007 (ASSIST, rev. August 2007)</i> <sup>3, 4</sup>
<b>Color Stability</b>	Chromaticity shift for LED packages over time shall not exceed 0.007 on the CIE 1976 (u', v') diagram (corresponds with a 7-step MacAdam ellipse).	
<b>Power Factor</b>	≥ 0.7	ANSI C82.77
<p><sup>1</sup> ASSIST, May 2008: Available at <a href="http://www.lrc.rpi.edu/programs/solidstate/assist/pdf/AR-LEDLightEngine-May2008.pdf">http://www.lrc.rpi.edu/programs/solidstate/assist/pdf/AR-LEDLightEngine-May2008.pdf</a>.</p> <p><sup>2</sup> Note: EPA understands that IESNA LM-79 ("IESNA Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products") may in the future incorporate LED light engine test procedures; as such EPA may reference LM-79 in future revisions of this specification.</p> <p><sup>3</sup> ASSIST, rev. August 2007: Available at <a href="http://www.lrc.rpi.edu/programs/solidstate/assist/pdf/ASSIST-LEDLife-revised2007.pdf">http://www.lrc.rpi.edu/programs/solidstate/assist/pdf/ASSIST-LEDLife-revised2007.pdf</a>.</p> <p><sup>4</sup> Note: EPA understands IESNA LM-80 ("IESNA Approved Method For Measuring Lumen Maintenance of LED Light Sources") to be under development as of June 2008, and may reference LM-80 in future revisions of this specification.</p>		

**ENERGY STAR Program Requirements for Residential Light Fixtures: Version 4.2 – ANNEX A**

**Table 4 – Indoor & Outdoor Fixtures Employing LED Light Engines for Primary Illumination**

<b>Performance Characteristic</b>	<b>ENERGY STAR Requirements</b>	<b>Methods of Measurement Reference Standards</b>
<b>Output Operating Frequency</b>	<p>≥ 120 Hz</p> <p>Note: This performance characteristic addresses problems with visible flicker due to low frequency operation and applies to steady-state as well as dimmed operation. Dimming operation shall meet the requirement at all light output levels.</p>	Oscilloscope instruction manual
<b>Noise</b>	Class A sound rating for power supplies within the fixture, not to exceed a measured level of 24 dBA (audible) when the power supplies are installed in the fixture.	Class A sound rating for power supplies within the fixture, not to exceed a measured level of 24 dBA (audible) when the power supplies are installed in the fixture and are 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.
<b>Transient Protection</b>	Power supply shall comply with ANSI/IEEE C62.41, Class A operation. The line transient shall consist of seven strikes of a 100 kHz ring wave, 2.5 kV level, for both common mode and differential mode.	ANSI/IEEE C62.41
<b>Electromagnetic and Radio Frequency Interference</b>	Power supplies must meet FCC requirements for consumer use (FCC 47 CFR Part 15/18 Consumer Emission Limits)	Consumer Limits per FCC 47 CFR Part 15/18
<b>Off State Power Consumption</b>	<p>Fixtures using integral occupancy sensors, motion sensors, or photosensors, or portable fixtures, shall consume no more than 0.5 watts in the off state.</p> <p>All other fixtures shall not consume power in the off state.</p> <p>Note: EPA encourages manufacturers to comply with requirements outlined in the <i>ENERGY STAR Program Requirements for Single Voltage AC-AC and AC-DC External Power Supplies</i>.</p>	No Standard Available (Use manufacturer protocol)
<b>Fixture Requirements</b>		
<b>Minimum Operating Temperature</b>  <i>Required for Outdoor Fixtures Only.</i>	Fixture shall have a minimum operating temperature of -20°C or below.	No Standard Available (Use manufacturer protocol)

**ENERGY STAR Program Requirements for Residential Light Fixtures: Version 4.2 – ANNEX A**

**Table 4 – Indoor & Outdoor Fixtures Employing LED Light Engines for Primary Illumination**

Performance Characteristic	ENERGY STAR Requirements	Methods of Measurement Reference Standards
<b>Warranty</b>	<p>A written warranty must be included with fixture packaging at the time of shipment, covering repair or replacement of replaceable defective electrical parts:</p> <p><b>Indoor fixtures:</b> for a minimum of three years from the date of purchase.</p> <p><b>Outdoor fixtures:</b> for a minimum of four years from the date of purchase.</p>	<p>No Standard Available (Use manufacturer protocol)</p>
<b>Additional Requirements for Indoor Fixtures</b>	<p>Indoor fixtures must also meet the following performance characteristics outlined in table 1:</p> <ul style="list-style-type: none"> <li>• Safety - Portable Fixtures</li> <li>• Safety - Hard-Wired Fixtures</li> </ul>	<p>Refer to table 1.</p>
<b>Additional Requirements for Outdoor Fixtures</b>	<p>Outdoor fixtures must also meet the following performance characteristics outlined in table 2A:</p> <ul style="list-style-type: none"> <li>• Maximum Input Power</li> <li>• Safety</li> <li>• Automatic Daylight Shutoff (fixtures &gt;13 watts only)</li> </ul>	<p>Refer to table 2A.</p>
<b>Product Packaging for Consumer Awareness</b>	<p><u>CCT Labeling:</u> Product packaging language is required that clearly describes the nominal color designation of the LED light engine in units of Kelvin.</p> <p><u>Dimming Capability and Compatibility:</u> External packaging must state any known incompatibilities with dimmers, occupancy or vacancy sensors, timing devices or any other external lighting controls. For LED fixtures that are dimmable, external packaging must clearly state the percentage range of dimming,</p> <p><u>Minimum Operating Temperature (outdoor fixtures only):</u> Product packaging must indicate the minimum (lowest) starting temperature of the fixture.</p>	<p>No Standard Available (Use manufacturer protocol)</p>

**ENERGY STAR Program Requirements for Residential Light Fixtures: Version 4.2 – ANNEX A**

**Table 4 – Indoor & Outdoor Fixtures Employing LED Light Engines for Primary Illumination**

Performance Characteristic	ENERGY STAR Requirements		Methods of Measurement Reference Standards
<b>Product Packaging for Consumer Awareness (con't)</b>	<u>Incandescent Equivalency:</u> Fixtures incorporating LED light engines generating < 800 lumens must clearly state on product packaging the incandescent light output equivalency of the LED light engine based on the table below:		No Standard Available (Use manufacturer protocol)  Note: EPA seeks to ensure that qualified fixtures meet consumer expectations for light output. Consumer preference for light output varies widely, and the same is true for fixture design intent. Therefore it is impractical to prescribe lumen values for various residential lighting fixture applications. This consumer awareness requirement is intended to help consumers understand the limitations of LED light engines producing less than 800 lumens (equivalent to 60 watts incandescent).
	Luminous Flux (Lumens)	Incandescent Equivalency (W)	
	≥ 40	6	
	≥ 70	10	
	≥ 250	25	
	≥ 450	40	
Example packaging declaration: “This fixture produces light equivalent to a 25 watt incandescent bulb.”			



**ENERGY STAR Program Requirements for Residential Light Fixtures: Version 4.2 – ANNEX A**

**Table 4 – Indoor & Outdoor Fixtures Employing LED Light Engines for Primary Illumination**

Performance Characteristic	Required Documentation
<ul style="list-style-type: none"> <li>• Efficacy</li> <li>• Color Rendering Index (CRI)</li> <li>• Correlated Color Temperature (CCT)</li> </ul>	<p><b>Provide:</b> A test report from a laboratory:</p> <ul style="list-style-type: none"> <li>• trained by a representative of the Lighting Research Center (RPI) on behalf of the Alliance for Solid-State Illumination Systems and Technologies (ASSIST); or</li> <li>• qualified to participate in the Department of Energy’s CALiPER program.</li> </ul> <p><i>Note: Upon availability of NVLAP accreditation for LED test methods, EPA will investigate test procedures under the proposed NVLAP scope and evaluate for inclusion here as an additional test report option.</i></p> <p>Sample Size:</p> <ul style="list-style-type: none"> <li>• 1 complete fixture sample (light engine installed); and</li> <li>• 2 additional light engine samples external to fixture; and</li> <li>• Any components and/or materials required to install additional LED light engines in fixture.</li> </ul>
<ul style="list-style-type: none"> <li>• Lumen Maintenance</li> <li>• Color Stability</li> </ul>	<p><b>Provide:</b></p> <ul style="list-style-type: none"> <li>• Lumen maintenance and color stability data declared by LED package manufacturer, in accordance with ASSIST Sample Data Sheet for High-Power LEDs (Issue 4); or</li> <li>• LED package datasheets conforming to IESNA LM-80 protocols, once the metric is available.</li> </ul>
<ul style="list-style-type: none"> <li>• Maximum Measured Driver/Driver Case Temperature</li> <li>• Power Factor</li> <li>• Transient Protection</li> </ul>	<p><b>Provide:</b></p> <ul style="list-style-type: none"> <li>• Laboratory test report</li> </ul> <p>Sample Size:</p> <ul style="list-style-type: none"> <li>• One light engine sample must be tested.</li> </ul>
<p><b>Warranty</b></p>	<p><b>Provide:</b> A copy of the actual fixture manufacturer written warranty that is included with product packaging.</p>
<p><b>Additional Requirements for Indoor Fixtures</b></p>	<p>Refer to table 1.</p>
<p><b>Additional Requirements for Outdoor Fixtures</b></p>	<p>Refer to table 2A.</p>
<p><b>Product Packaging for Consumer Awareness</b></p>	<p><b>Provide:</b> A written copy or a PDF graphic of the language that will be displayed on product packaging, and within the packaging as required (e.g., installation instructions for air-tight rated fixtures).</p> <p>If product is marketed as dimmable, a copy of the language that includes dimming range and known lighting control incompatibilities.</p>