



# ENERGY STAR® Program Requirements for Residential Light Fixtures

## Eligibility Criteria – Version 4.0

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# ENERGY STAR® Program Requirements for Residential Light Fixtures

## Eligibility Criteria – Version 4.0

Below is the product specification (Version 4.0) for ENERGY STAR qualified residential light fixtures. A product must meet all of the identified criteria if it is to be labeled as ENERGY STAR by its manufacturer.

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

- 1) **Definitions:** Below is a brief definition of a light fixture and other related terms as relevant to ENERGY STAR:
  - A. **ALA:** American Lighting Association.
  - B. **ANSI:** American National Standards Institute.
  - C. **APLAC:** Asia Pacific Laboratory Accreditation Cooperation (NVLAP MRA Signatory).
  - D. **Automatic Daylight Shutoff:** A photocell device that automatically prevents operation of a fixture during daylight hours.
  - E. **Ballast:** A device used with an electric-discharge lamp to obtain the necessary circuit conditions (voltage, current, and waveform) for starting and operating.
  - F. **Ballast Frequency:** The frequency at which the ballast operates the lamp, measured in Hertz (Hz) or Kilohertz (kHz).
  - G. **CIE:** Commission Internationale de l'Eclairage.
  - H. **Color Rendering:** The effect that the spectral characteristics of the light emitted by the lamp has on the color appearance of the objects illuminated by the lamp. Color Rendering Index is measured on a scale of zero to 100, and is defined in terms of a comparison of the spectral tri-stimulus values of the objects under test illumination and a reference or standard illumination according to the recommendations of CIE Publication No. 13.3.
  - I. **Compact Fluorescent Lamp:** A single based fluorescent lamp with a plug-in lamp base, including multi-tube, multibend, spiral, and circline types.
  - J. **Correlated Color Temperature (CCT):** The actual color of the lamp is called the color temperature and is defined in terms of the spectral tri-stimulus values (color coordinates) according to the recommendations of IESNA LM-16. For color coordinates near the Black Body loci, the correlated color temperature, measured in Kelvin (K), is used.
  - K. **Electronic Ballast:** A ballast which uses semi-conductor components to increase the frequency of fluorescent lamp operation. Fluorescent system efficiency is increased due to the higher frequency.
  - L. **IEC:** International Electrotechnical Commission.
  - M. **IESNA:** Illuminating Engineering Society of North America.
  - N. **ILAC:** International Laboratory Accreditation Cooperation (NVLAP MRA Signatory).
  - O. **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).

- P. Lamp: A generic term for a manufactured source of light. By extension, the term is also used to denote sources that radiate in the visible spectrum.
- Q. 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.
- R. 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.
- S. Lampholder: A component of a fixture, which supplies power to the lamp and also holds the lamp in place.
- T. 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.
- U. Linear Fluorescent Lamp: A double based fluorescent lamp with a plug-in lamp base, including straight shaped or U-bent types.
- V. Magnetic Ballast: A ballast which uses a magnetic core and copper winding and operates at the frequency of the line voltage.
- W. MRA: Mutual Recognition Arrangement.
- X. NACLA: National Cooperation for Laboratory Accreditation (NVLAP MRA Signatory).
- Y. NEMA: National Electrical Manufacturers Association.
- Z. NFPA: The National Fire Protection Association (United States), which develops the National Electrical Code (NEC).
- AA. NRTL: Nationally Recognized Testing Laboratory as recognized by OSHA's NRTL Program, which is a part of OSHA's Directorate of Technical Support.
- BB. NVLAP: National Voluntary Laboratory Accreditation Program.
- CC. Optics: Include reflectors, baffles, lenses and/or diffusers, all which control the light distribution and the appearance of the lighted fixture.
- DD. OSHA: Occupational Safety & Health Administration.
- EE. 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.
- FF. 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).
- GG. 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.
- HH. 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 ( $\theta$ ) specified in Table 1 and 2 of ANSI C78.376-2001, and a defined variance of seven steps.
- II. 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.
- JJ. UL: Underwriters Laboratories.

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

**Exclusion of magnetic ballasts:** Indoor fixtures that use magnetic ballasts cannot be ENERGY STAR qualified under this Version 4.0 specification. Only outdoor fixtures that use high intensity discharge (HID) lamps, such as metal halide and high pressure sodium, may continue to use magnetic ballasts.

**Allowance of self-ballasted pin based lamps:** Indoor and outdoor fixtures that use self-ballasted pin based lamp can be ENERGY STAR qualified fixtures if all applicable requirements for qualifying products (Table 1 & 1A for indoor fixtures or Table 2A or 2B for outdoor fixtures) are met. This includes the requirement that the average rated life of the lamp must meet or exceed 10,000 hours and that the maximum measured ballast case temperature during normal operation inside the fixture(s) does not exceed the ballast manufacturer maximum recommended temperature. In addition for ballasts that drive lamps 26 watts and lower the line-voltage socket must comply with the standard design developed by EPA and industry. Specific technical details for this standard design are located at: <http://www.lrc.rpi.edu/programs/lightingTransformation/lineVoltage/index.asp>

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

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

**Table 1 - Indoor Fixtures**

Performance Characteristic	ENERGY STAR Specification
<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>	

<b>Combined Lamp &amp; Ballast Requirements:</b>	
System Efficacy Per Lamp Ballast Platform in Lumens Per Watt (LPW) <sup>1</sup> ,	<p>≥ 50 LPW for all lamp types below 30 total listed lamp watts.</p> <p>≥ 60 LPW for all lamp types that are ≤ 24 inches and ≥ 30 total listed lamp watts.</p> <p>≥ 70 LPW for all lamp types that are &gt; 24 inches and ≥ 30 total listed lamp watts.</p>
<b>Lamp Requirements:</b>	
Lamp Life	<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>
Lumen Maintenance	For lamps indicated on the fixture packaging or shipped with the fixtures, the lamp shall have an average rated lumen maintenance of at least 80% of initial lamp lumens at 40% (4,000 hours minimum) rated lamp life.
Color Rendering Index	<p>For lamps shipped with the fixtures, the color rendering index must meet the following requirements:</p> <p>≥ 80 for compact fluorescent lamps.            ≥ 75 for linear fluorescent lamps.</p> <p>If the lamp is not shipped with the fixture, product packaging must meet the requirements set forth in the “Product Packaging for Consumer Awareness” section of this Table.</p>
Correlated Color Temperature	<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>
Lamp/Lampholder Compatibility	<p>For lamps indicated on the fixture packaging or shipped with the fixtures, lamps must utilize an ANSI/IEC standardized lamp base configuration, as defined by ANSI C81.61 and IEC 60061-1.</p> <p>The lampholder must be designed to accept lamps with ANSI/IEC standardized lamp base configurations for all applicable wattages. For example, if the ballast can operate lamps with multiple wattages (e.g., an 18W, 26W, or 32W lamp) then the lampholder must be designed to accept lamps with ANSI/IEC standardized lamp base configurations for</p>

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

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

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

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

	<p>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 Table 3.</li> </ul>
Lamp Labeling Requirement	For lamps shipped with fixtures, a manufacturer designation that encompasses the lamp manufacturer name, wattage, correlated color temperature, and color rendering index must be labeled on the lamp or lamp base.
<b>Electronic Ballast Requirements</b>	
<b>(Note: Magnetic Ballasts May Not Be Used in Indoor Fixtures):</b>	
General	Per ANSI C82.11 Section 5 except paragraph 5.3.1.
Lamp Start Time	The time needed after switching on the lamp to start continuously and remain illuminated must be an average of one second or less.
Power Factor	$\geq 0.5$
Lamp Current Crest Factor	$\leq 1.7$
Maximum Measured Ballast Case Temperature During Normal Operation Inside Fixture(s)	<p><u>Not</u> to exceed the ballast manufacturer maximum recommended ballast case temperature during normal operation inside a fixture.</p> <p><b>Note:</b> This performance characteristic is separate and distinct from thermal requirements established by UL, which governs safety rather than longevity of the ballast. All qualified fixtures are expected to meet this requirement, including linear, suspended, close-to-ceiling, IC, ICAT and Non-IC recessed canisters, etc. as well as those fixtures that may be exempt from UL1598.</p>
Electromagnetic and Radio Frequency Interference	Ballast must meet FCC requirements for consumer use (FCC 47 CFR Part 18 Consumer Emission Limits)
Ballast Frequency	20 to 33 kHz or $\geq 40$ kHz
Transient Protection	Per ANSI C82.11b, paragraph 5.10.1 (100kHz Ring Wave, 2.5kV, both common mode and differential mode, 7 strikes)
End of Life Protection	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.
Dimming	Torchiere style portable fixtures shall be dimmable from 100% to 30%, or less, of maximum light output, or be switchable to three levels of brightness, not including the off position.

	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.
Safety - Ballasts and "Non Edison base Fluorescent Adapters"	The cover page of a safety test report or a general coverage statement must be provided to demonstrate compliance with ANSI/UL 935 or UL 1993, as appropriate.
<b>Fixture Requirements</b>	
Fixture Warranty	A written warranty must be included with fixture packaging at the time of shipment, which covers repair or replacement of defective parts of the fixture housing, optics, trim and electronics (excluding the lamp) for a minimum of two years from the date of purchase.
Noise	Class A sound rating for electronic ballasts within the fixture, not to exceed a measured level of 24 dBA (audible) when the ballast is installed in the fixture.
Lamp Shipment Requirement	All indoor fixtures must be shipped with a lamp, except for the following fixture types: <ol style="list-style-type: none"> <li>1. Recessed downlight fixtures and recessed downlight retrofit kits</li> <li>2. Fixtures using linear fluorescent lamps</li> </ol>
Replaceable ballast	Ballasts in all fixtures (including portables) must be accessible and removable by an electrician without the cutting of wires and without damage to the fixture housing, trim, decorative elements or the carpentry (e.g., ceiling drywall) to which the fixture is attached.
Safety - Portable Fixtures	The cover page of a safety test report or a general coverage statement must be provided to demonstrate compliance with ANSI/UL 153.
Safety - Hardwired Fixtures	The cover page of a safety test report or a general coverage statement must be provided to demonstrate compliance with UL 1598.
Recessed Downlight Fixtures-Insulation Contact (IC)-Rated	Recessed downlight fixtures that are either IC-Rated for direct contact with insulation or non IC-Rated may qualify as ENERGY STAR. For fixtures to be considered IC-Rated they must be approved for zero clearance insulation cover (IC) by an OSHA NRTL laboratory. Recessed downlight fixtures that are IC-Rated must also meet the requirements for air tight fixtures, listed below.
Recessed Downlight Fixtures-Air Tight For Restricted Air Movement	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.  For recessed downlight fixtures that are air tight, the following measures must be taken to ensure that fixtures can be properly installed and inspected: <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>

	<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 air-tight operation, the instructions should alternatively show how a gasket is to be attached, what type of caulk to use and how it should be applied, or which certified airtight trim kits are designed to be installed with the luminaire housing.</p>
<p>Product Packaging for Consumer Awareness Requirements</p>	<p><u>For fixtures that are not shipped with lamps</u>, product packaging must include a list of 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><u>For fixtures that are shipped with lamps</u>, product packaging language is required that clearly describes the nominal color designation of the lamp in units of Kelvin (i.e., 2700K, 3000K, 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 Specification
<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>	
Reflectors	Reflectors must be included to maximize fixture efficiency.
Aperture	Maximum 7.0”



<p>Air Tight For Restricted Air Movement</p>	<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 air-tight operation, the instructions should alternatively show how a gasket is to be attached, what type of caulk to use and how it should be applied, or which certified airtight trim kits are designed to be installed with the luminaire housing.</li> </ol>
<p>Electrical Connections</p>	<p>Edison lamp socket with wire “pigtail” to the ballast.</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>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>

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

Performance Characteristic	ENERGY STAR Specification
<p><b>Note:</b> Only electronic ballasts may be used to meet the requirements of this table with the exception of high intensity discharge lamps, such as metal halide or high pressure sodium lamps. In these cases magnetic ballasts can still be used. In addition, fixtures that utilize compact fluorescent lamps that do not have a plug-in base (i.e use a mogul, medium, or other screw base) are not eligible to earn the ENERGY STAR. For example, a screw-based compact fluorescent lamp may not be used, though a metal halide lamp may be used.</p>	
<p><b>Combined Lamp &amp; Ballast Requirements:</b></p>	
<p>System Efficacy Per Lamp Ballast Platform in Lumens Per Watt (LPW)</p>	<p>≥ 40 LPW for all lamp types below 15 total listed lamp watts.</p> <p>≥ 50 LPW for all lamp types over 15 total listed lamp watts up to 30 total listed lamp watts</p> <p>≥ 60 LPW for all lamp types over 30 total listed lamp watts</p>
<p><b>Lamp Requirements:</b></p>	
<p>Lamp Life</p>	<p>For lamps shipped with the fixtures, the average rated life of the lamp must be ≥10,000 hours.</p> <p>If the lamp is not shipped with the fixture, product packaging must meet the requirements set forth in the “Product Packaging for Consumer Awareness” section of this Table.</p>
<p>Lamp/Lampholder Compatibility</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 Table 3.</li> </ul>
<p><b>Ballast Requirements:</b></p>	
<p>Electromagnetic and Radio Frequency Interference</p>	<p>Ballast must be FCC rated for consumer use (FCC 47 CFR Part 18 Consumer Emission Limits).</p>

End of Life (EOL) Protection	All ballasts that operate lamps sized T5 and smaller must contain an end of life protection circuit, per ANSI/IEC requirements. For ballasts that operate multiple lamps and are required to have end of life protection, the ballast must shut down no more than two lamps when one of the lamps has reached end of life. For example, a fixture with one ballast and five lamps must not shut down more than the lamp that has reached end of life plus one additional lamp.
<b>Fixture Requirements:</b>	
Maximum Input Power	150 watts
Automatic Daylight Shutoff	The fixture must contain an integrated photosensor that automatically prevents operation during daylight hours. In addition, the control must automatically reactivate within 24 hours of a manual override or testing operation.
Fixture Warranty	A written warranty must be included with fixture packaging at shipment, which covers repair or replacement of defective parts of the fixture housing or electronics (excluding the lamp) for a minimum of two years from the date of purchase.
Replaceable ballast	Ballasts must be accessible to and removable by an electrician without the cutting of wires and without damage to the fixture housing, trim, decorative elements or the carpentry (e.g. ceiling drywall) to which the fixture is attached.
Safety	Fixtures must be compliant with NFPA 70, the National Electrical Code (NEC), including requirements for wet or damp locations (Articles 410-4a and Article 100).
Product Packaging for Consumer Awareness Requirements	<p>For fixtures that are not shipped with lamps, product packaging must include a list of lamp types that would provide ENERGY STAR quality and performance when paired with the qualifying fixtures. This list must be clearly visible to the consumer on the fixture packaging.</p> <p>Manufacturers are not required to provide specific lamp manufacturer names and model numbers on the packaging. Rather, generic lamp listings, such as the NEMA or ANSI generic descriptions including a color designation (e.g., F32T8/830 or CFQ26W/G24q/827), will suffice. In addition, consumers should be directed to select a lamp with a rated life of 10,000 hours or more.</p> <p>Product packaging must indicate the minimum (lowest) starting temperature for the lamp and ballast platform of the fixture.</p> <p>If the automatic daylight shutoff control can be adjusted such that the fixture can operate during full daylight, or automatic reactivation will not occur within 24 hours of a manual override or testing operation, additional packaging language is required that provides a 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>

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

Performance Characteristic	ENERGY STAR Specification
<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>	
Maximum Input Power	250 watts
Automatic Daylight Shutoff	The fixture must contain an integrated photosensor that automatically prevents operation during daylight hours. In addition, the control must automatically reactivate within 24 hours of a manual override or testing operation.
Motion Control	<p>The fixture must contain an integrated motion sensor that employs infrared sensing technology.</p> <p>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>
Fixture Warranty	A written warranty must be included with fixture packaging at shipment, which covers repair or replacement of defective parts of the fixture housing or electronics (excluding the lamp) for a minimum of two years from the date of purchase.
Replaceable ballast	If a ballast is present in the fixture, it must be accessible to and removable by an electrician without the cutting of wires and without damage to the fixture housing, trim, decorative elements or the carpentry (e.g., ceiling drywall) to which the fixture is attached.
Safety	Fixtures must be compliant with NFPA 70, the National Electrical Code (NEC), including requirements for wet or damp locations (Articles 410-4a and Article 100).
Product Packaging for Consumer Awareness Requirements	<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</p>

	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.
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4) Qualification Process, Acceptable Sources of Documentation, Reference Standards & Required Documentation:

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

Qualification Process:

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

A. Partner must test qualifying products and obtain required documentation to meet the performance characteristics listed in Section 3 of this specification. Refer to Table 3, below, to determine the reference standard and required documentation applicable to each performance characteristic.

The following stipulations apply:

- For multiple fixture models that use the same lamp/ballast combination, only one set of test results is required. For example, two fixtures that use the same lamp and ballast combination, but have different trim, lens and/or chase need only be tested once.
- For fixture models that may use different ballasts (either in terms of the type of ballast or manufacturer), each lamp/ballast combination must undergo testing and the test results must be submitted for qualification. For example, if a residential light fixture partner plans to use ballasts from several manufacturers in any one fixture, the fixture must be tested with each manufacturer’s ballast.
- For fixture models with one ballast type that can work with multiple lamp types, the fixtures need only be tested with one lamp type. The lamp type must either be the one supplied with the fixture at shipment or, if a lamp is not supplied, one of the lamp types listed on the packaging. Please note that EPA expects all lamps listed on the packaging to comply with the specification when operating on the fixture’s ballast. To ease the burden on the manufacturer, however, test data need be submitted for only one lamp type operating on the fixture’s ballast.

B. Submit a completed and signed copy of the ENERGY STAR Residential Light Fixture Qualified Product Information (QPI) form, along with required documentation, to the address listed on the QPI form. To obtain the current version of the QPI form, visit the “Lighting” section of the ENERGY STAR Web site at [www.energystar.gov/partners](http://www.energystar.gov/partners) and click on “Product Specifications.”

Acceptable Sources of Documentation:

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

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

scope of accreditation that includes the method of measurement reference standard for this performance characteristic. Partners should obtain from the laboratory both its certificate of accreditation and its scope of accreditation and submit them to ENERGY STAR.

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

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

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

Reference Standards & Required Documentation:

**Table 3 – Reference Standards and Required Documentation**

<b>Performance Characteristic</b> (refer to Tables 1, 1A, 2A or 2B as appropriate)	<b>Methods of Measurement Reference Standards</b>	<b>Required Documentation</b> (to be attached to QPI Form)
System Efficacy: Lamp Lumens Input Power (Tables 1, 2A)	IESNA LM-9; LM-66; ANSI C82.2	Laboratory test results must be produced using the specific lamp and ballast combination that will operate in the fixture. For this test, a sample of three or more lamps must be used. Two of the three samples must pass in order to qualify for ENERGY STAR.  Provide: <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the fixture and the test result for this performance characteristic; or</li> <li>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices.</li> </ol> <p><b>Note:</b> If the laboratory used for this test is accredited by NVLAP or one of its MRA signatories it must also have a scope of accreditation that includes the method of measurement reference standard for this performance characteristic.</p>
Reflectors (Table 1A)	No Standard Available (Use manufacturer protocol)	No supplemental documentation required.

<p>Lamp Start Time (Table 1)</p>	<p>ANSI C82.11-5.2</p>	<p>Laboratory test results must be produced using the specific lamp and ballast combination that will operate in the fixture. For this test, a sample of three or more lamps must be used. Two of the three samples must pass in order to qualify for ENERGY STAR.</p> <p>Provide:</p> <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the fixture and the test result for this performance characteristic; or</li> <li>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or</li> <li>4. a test report from an OSHA NRTL laboratory.</li> </ol>
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<p>Lamp Life (Tables 1, 2A)</p>	<p>IESNA LM-40-01; LM-65-01; IEC 60091; IEC 60901; ANSI C82.1; ANSI C82.11</p>	<p>Laboratory test results must be produced using the specific lamp that will operate in the fixture and either the ballast that will operate in the fixture or a commercially available ballast that meets the applicable ANSI ballast requirements for the lamp being tested. For this test, a sample of ten or more lamps must be used.</p> <p>Provide:</p> <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the fixture and the test result for this performance characteristic; or</li> <li>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or</li> <li>4. a test report from an ISO 9000 registered facility.</li> </ol> <p>Manufacturers may obtain ENERGY STAR conditional qualification for their fixture if all of the following items are provided:</p> <ol style="list-style-type: none"> <li>1) A letter on letterhead from a NVLAP laboratory, one of its MRA signatories, or an ISO 9000 registered facility demonstrating lamp life testing has begun.</li> <li>2) A laboratory report proving that testing has been completed for at least 40% of rated life.</li> <li>3) The date for testing completion.</li> </ol> <p>Conditional approval will only be granted for a period of no longer than 325 days.</p> <p><b>Note:</b> If the laboratory used for this test is accredited by NVLAP or one of its MRA signatories it must also have a scope of accreditation that includes the method of measurement reference standard for this performance characteristic.</p>
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<p>Lumen Maintenance (Table 1)</p>	<p>IESNA LM-40-01; IESNA LM-9-99; IESNA LM-65-01; IESNA LM-66-00; ANSI C78.5</p>	<p>Laboratory test results must be produced using the specific lamp that will operate in the fixture. For this test, a sample of ten or more lamps must be used to demonstrate that at least 80% of the samples achieved the required lumen maintenance value.</p> <p>Provide:</p> <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by NVLAP, one of its MRA signatories; or</li> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the fixture and the test result for this performance characteristic; or</li> <li>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or</li> <li>4. a test report from an ISO 9000 registered facility.</li> </ol>
<p>Color Rendering Index (Table 1)</p>	<p>IESNA LM-58; CIE 13.3</p>	<p>Laboratory test results must be produced using the specific lamp that will operate in the fixture. For this test, a sample of ten or more lamps must be used to demonstrate that at least 80% of the samples achieved the required color rendering index value.</p> <p>Provide:</p> <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the fixture and the test result for this performance characteristic; or</li> <li>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices.</li> </ol> <p><b>Note:</b> If the laboratory used for this test is accredited by NVLAP or one of its MRA signatories it must also have a scope of accreditation that includes the method of measurement reference standard for this performance characteristic.</p>

<p>Correlated Color Temperature (Table 1)</p>	<p>IESNA LM-58; LM-16</p>	<p>Laboratory test results must be produced using the specific lamp that will operate in the fixture. For this test, a sample of ten or more lamps must be used. Test results must demonstrate that at least 90% of the lamps tested fall within a 7-step ANSI Mac Adam ellipse.</p> <p>Provide:</p> <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by NVLAP, one of its MRA signatories; or</li> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the fixture and the test result for this performance characteristic; or</li> <li>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or</li> <li>4. a test report from an ISO 9000 registered facility.</li> </ol> <p>It is also intended that the lamp manufacturer will meet the following quality requirements during the production runs of each lamp model:</p> <ol style="list-style-type: none"> <li>1. The lamp manufacturer is required to maintain color control such that a minimum of 90 percent of the ongoing production (as represented by samples tested from each production shift for the same color and when typically evaluated over 12 month period) will fall within the 7 step Mac Adam color ellipse associated with the designated (manufacturer declared) target color.</li> <li>2. For the purposes of meeting color control the lamp manufacturer must maintain testing equipment calibrated to international practices and standards and must compile the ongoing color control data in a manner so that is can be easily reviewed upon EPA request.</li> <li>3. At a minimum, the manufacturer's color quality control program must maintain the following information for a 3-year period:</li> </ol>
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		<ul style="list-style-type: none"> <li>a. Test dates and sample size (minimum of two lamps per production shift)</li> <li>b. Test results (x,y) for each sample lamp measured</li> <li>c. Test results (all x,y data) for sample lamps plotted graphically against the designated seven step color ellipse and available for review at least on a quarterly basis</li> <li>d. Records to substantiate that 90 percent of the (x,y) data points fall within the applicable seven (7) step Mac Adam ellipse. Manufacturers are encouraged to exceed this target.</li> </ul>
Noise (Table 1)	Class A sound rating for electronic ballasts within the fixture, not to exceed a measured level of 24 dBA (audible) when the ballast is installed in the fixture and is measured using a sound meter (similar in performance to B&K type 2209) where the microphone is located 12 inches from the fixture in any direction.	No supplemental documentation required.  <b>Note:</b> A laboratory test report must be submitted upon EPA request.
Fixture Warranty (Tables 1, 2A, 2B)	No Standard Available (Use manufacturer protocol)	Provide a copy of the actual two-year fixture manufacturer written warranty that is included with product packaging.
Dimming (Table 1)	No Standard Available (Use manufacturer protocol)	No supplemental documentation required.  <b>Note:</b> A laboratory test report proving the fixture is dimmable from 100% to 30% must be submitted upon EPA request.
<u>Lamp/Lampholder Compatibility:</u> (Tables 1, 2A)		
Lamp Base Configuration	ANSI C81.61; IEC 60061-1	Provide manufacturer data indicating the lamp base type used.

<p>Lamps Compliant with an ANSI-IEC Standard (for lamp dimensions and electrical parameters)</p> <p>Lamps Not Compliant with an ANSI-IEC Standard (for lamp dimensions and electrical parameters)</p>	<p>ANSI C78.901-2001; ANSI C78.81-2001; IEC 60901; IEC 60081</p> <p>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>Provide manufacturer data indicating applicable ANSI-IEC lamp data sheet number.</p> <p>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>
<p>Lamp Labeling Requirement (Table 1)</p>	<p>No Standard Available (Use manufacturer protocol)</p>	<p>Provide a copy of the actual language that will be included on the base of the lamp.</p>
<p>Replaceable Ballast (Tables 1, 2A, 2B)</p>	<p>No Standard Available (Use manufacturer protocol)</p>	<p>Provide a copy of the language that includes guidance on ballast replacement and states that the ballast is replaceable with the use of a “qualified electrician.”</p>
<p><u>Safety: Indoor</u></p> <ul style="list-style-type: none"> <li>• Portable Fixtures (Table 1)</li> <li>• Hardwired Fixtures (Table 1)</li> </ul>	<p>ANSI/UL 153</p> <p>UL 1598</p>	<p>Provide the cover page of a safety test report or a general coverage statement from an OSHA NRTL laboratory.</p> <p>Provide the cover page of a safety test report or a general coverage statement from an OSHA NRTL laboratory.</p>

<ul style="list-style-type: none"> <li>• Ballasts and “Non-Edison based Fluorescent Adapters” (Table 1)</li> <li>• Fixture Conversions, Retrofits (Table 1A)</li> </ul>	<p>ANSI/UL 935 or UL 1993</p> <p>UL 1598 and UL 1598B</p>	<p>Provide the cover page of a safety test report or a general coverage statement from an OSHA NRTL laboratory.</p> <p>Provide the cover page of a safety test report or a general coverage statement from an OSHA NRTL laboratory.</p>
<p><u>Safety: Outdoor</u> (Tables 2A &amp; 2B)</p>	<p>NFPA 70, the National Electrical Code (NEC), including requirements for wet locations when applicable (Articles 410-4a and Article 100)</p>	<p>Provide the cover page of a safety test report or a general coverage statement from an OSHA NRTL laboratory. Include evidence of a Rain Test for Wet Locations, when applicable.</p>
<p>Power Factor (Table 1)</p>	<p>ANSI C82.11-3.3.1</p>	<p>Laboratory test results must be produced using the specific ballast that will operate in the fixture. For this test, a sample of three or more ballasts must be used. At least two of the three samples must pass in order to qualify for ENERGY STAR.</p> <p>Provide:</p> <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the fixture and the test result for this performance characteristic; or</li> <li>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or</li> <li>4. a test report from the manufacturer</li> </ol>

<p>Lamp Current Crest Factor (Table 1)</p>	<p>ANSI C82.11-3.3.3 and 5.6 ANSI C82.1-5.6.1</p>	<p>Laboratory test results must be produced using the specific ballast that will operate in the fixture. For this test, a sample of three or more ballasts must be used. At least two of the three samples must pass in order to qualify for ENERGY STAR.</p> <p>Provide:</p> <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the fixture and the test result for this performance characteristic; or</li> <li>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or</li> <li>4. a test report from an OSHA NRTL laboratory.</li> </ol>
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<p>Measured Maximum Ballast Case Temperature During Normal Operation Inside Fixture(s) (Table 1)</p>	<p>UL 1598, Section 11 (Acceptable when the thermocouple is placed at the hot-spot location indicated by the ballast manufacturer.)</p> <p style="text-align: center;">-OR-</p> <p>Lighting Research Center (LRC) "Proposed Durability Testing Method: Temperature" available at <a href="http://www.lrc.rpi.edu/programs/lightingTransformation/pdf/durabilityTestingFinalReport.pdf">http://www.lrc.rpi.edu/programs/lightingTransformation/pdf/durabilityTestingFinalReport.pdf</a></p> <p><b>Note:</b> All qualified fixtures are expected to meet the Measured Maximum Ballast Case Temperature During Normal Operation Inside Fixture(s) requirement. This includes every qualified fixture including linear, suspended, close-to-ceiling, IC, ICAT and Non-IC recessed canisters, etc. as well as those fixtures that may be exempt from UL1598.</p>	<p>Laboratory test results must be produced using the fixture with the highest operating temperature among all fixtures being qualified, the specific ballast that will operate in the fixture, and a lamp with the same wattage and lamp type (e.g., triple-tube, quad tube, spiral) that will operate in the fixture. For this test, a sample of one or more fixtures must be used.</p> <p>The supplemental documentation should include the following:</p> <ul style="list-style-type: none"> <li>• Fixture model(s) tested</li> <li>• Lamp model(s) and ballast model(s) tested</li> <li>• Measured maximum ballast case temperatures</li> <li>• Ambient temperature</li> <li>• Test procedure, including description of fixture installation, thermocouple location(s), and time that elapsed before readings were taken.</li> <li>• Ballast Manufacturer Maximum Recommended Case Temperature During Normal Operation Inside the Fixture(s)</li> <li>• Ballast Hot Spot Location Diagram from the ballast manufacturer</li> </ul> <p>Provide a test report from:</p> <ol style="list-style-type: none"> <li>1. a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>2. an OSHA NRTL laboratory; or</li> <li>3. the fixture or ballast manufacturer</li> </ol>
<p>Electromagnetic and Radio Frequency Interference (Tables 1, 2A)</p>	<p>Consumer Limits Per FCC 47 CFR Part 18.305 and 18.307</p>	<p>No supplemental documentation required.</p> <p><b>Note:</b> A laboratory test report must be submitted upon EPA request.</p>



Ballast Frequency (Table 1)	Oscilloscope instruction manual	<p>Laboratory test results must be produced using the specific ballast that will operate in the fixture. At least two of the three samples must pass in order to qualify for ENERGY STAR.</p> <p>Provide:</p> <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the fixture and the test result for this performance characteristic; or</li> <li>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or</li> <li>4. a test report from the manufacturer</li> </ol>
Transient Protection (Table 1)	ANSI C82.11b, paragraph 5.10.1	<p>Laboratory test results must be produced using the specific ballast that will operate in the fixture. For this test, a sample of three or more ballasts must be used. All samples must pass in order to qualify for ENERGY STAR.</p> <p>Provide:</p> <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the fixture and the test result for this performance characteristic; or</li> <li>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or</li> <li>4. a test report from the manufacturer</li> </ol>

End of Life Protection (Table 1)	IEC 61347-2-3 Amendment 1 to Edition 1 2004-06 (or ANSI C82.11-2005, upon its release)	<p>Laboratory test results must be produced using the specific ballast that will operate in the fixture. For this test, a sample of one or more ballasts must be used.</p> <p>For all ballasts that that operate T4 and/or T5 sized lamps, demonstrate that the ballast is in compliance with the referenced standards by providing:</p> <ol style="list-style-type: none"> <li>1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the fixture and the test result for this performance characteristic; or</li> <li>3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or</li> <li>4. a test report from the ballast manufacturer</li> </ol> <p>For all ballasts that operate T3 and smaller sized lamps, provide from the ballast manufacturer a circuit diagram and an accompanying engineering description outlining the scheme that is used to achieve the end of life function within the ballast.</p>
Aperture (Table 1A)	No Standard Available (Use manufacturer protocol)	No supplemental documentation required.
Restricted Air Movement (Table 1A)	ASTM E283	<p>Laboratory test results must be produced using each specific fixture that will be qualified. For this test, a sample of one or more fixtures must be used.</p> <p>Provide a test report from:</p> <ol style="list-style-type: none"> <li>1. a laboratory accredited by NVLAP or one of its MRA signatories; or</li> <li>2. an OSHA NRTL laboratory; or</li> <li>3. the fixture manufacturer</li> </ol>
Electrical Connections (Table 1A)	No Standard Available (Use manufacturer protocol)	Supply engineering description and/or schematic.

<p>Product Packaging for Consumer Awareness Requirements (Table 1, 1A, 2A, &amp; 2B)</p>	<p>No Standard Available (Use manufacturer protocol)</p>	<p>Provide a written copy or a PDF graphic of the language that will be displayed on product packaging and within the packaging, as required (i.e., installation instructions for air-tight rated fixtures).</p>
<p>Automatic Daylight Shutoff (Tables 2A, 2B)</p>	<p>No Standard Available (Use manufacturer protocol)</p>	<p>Provide applicable sections of fixture manual(s) that demonstrate controls exist for each fixture being submitted.</p> <p>Note: A laboratory test report must be submitted upon EPA request.</p>
<p>Motion Control (Table 2B)</p>	<p>No Standard Available (Use manufacturer protocol)</p>	<p>Provide applicable sections of fixture manual(s) that demonstrate controls exist for each fixture being submitted.</p> <p><b>Note:</b> A laboratory test report must be submitted upon EPA request.</p>

5) Additional Quality Assurance Requirements: The following requirements outline a manufacturer-financed quality assurance system that will allow for independent evaluation of ENERGY STAR qualified fixtures. These requirements will go into effect on October 1, 2005. Upon the effective date, EPA may start requesting 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.

1. **Quality Assurance Testing**: EPA will select fixtures each year for quality assurance testing. The manufacturer of each selected fixture will be required to commission third-party testing of the specified fixture by a manufacturer-independent NVLAP accredited testing lab. The testing lab will procure three (3) samples of each fixture on the open market (if possible), with the first sample used for initial testing.

If all performance parameters are met during initial testing, the second and third sample will not be tested, unless the first sample becomes damaged or is otherwise unavailable for testing.

If the first sample fails one of the consumer informational parameters, EPA will contact the manufacturer to resolve the failure.

If the first sample fails one of the performance parameters, the second and third samples will be tested for all of the performance parameters.

#### Performance Parameters

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

#### Consumer Informational Parameters

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

#### Schedule Requirements:

Initial testing must commence within 30 days of EPA notification to the manufacturer. Testing on the first sample must be completed within 270 days of initial notification by EPA. If the second and third samples need to be tested, testing needs to be completed within 240 days of failure of the first sample.

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

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

2. **Challenge Testing**: Any party who believes that a non-compliant fixture is using the ENERGY STAR mark may initiate a challenge test. (If the compliance failure is related to one of the consumer informational parameters, the challenger should contact EPA, which will handle the problem without resort to a challenge test.) The challenger shall initiate the challenge by informing EPA or its designated agent of the challenge in writing; the challenge must include the manufacturer and model number of the challenged product as well as the parameter or parameters of the specification that are under challenge. EPA or its agent will select a manufacturer-independent NVLAP-accredited

testing lab to conduct the testing and obtain a price quote from the lab for testing the challenged parameter(s). EPA will then request that the challenger and the manufacturer both make the necessary financial and contractual arrangements with the testing lab. The challenger's failure to do so will cancel the challenge test; the manufacturer's failure to do so will be deemed a challenge failure. The two parties must finalize testing arrangements with the selected laboratory within 30 days of EPA's final selection of the laboratory.

The testing lab will procure three samples of each fixture on the open market (if possible), with the first sample used for initial testing.

If the challenged performance parameters are met during initial testing, the second and third sample will not be tested, unless the first sample becomes damaged or is otherwise unavailable for testing.

If the first sample fails one of the challenged performance parameters, the second and third samples will be tested for the challenged parameters.

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

The testing lab will report its findings to EPA, which will forward the data to the challenger and the manufacturer. If the fixture is subjected to EPA's delisting protocol, the challenged manufacturer shall pay for the testing. If the fixture is NOT subjected to EPA's delisting protocol, the challenger shall pay for the testing.

- 6) **Effective Date:** The date that all ENERGY STAR qualified residential lighting fixtures must meet Version 4.0 will be defined as the *effective date* of the agreement. The ENERGY STAR Version 4.0 Eligibility Criteria (aka Specification) for Residential Light Fixtures shall go into effect on **October 1, 2005**. Any previously executed agreement on the subject of ENERGY STAR qualified residential light fixtures shall be terminated effective September 30, 2005.
  - A. **Qualifying and Labeling Products under the Version 4.0 Specification:** All products, including models originally qualified prior to Version 4.0 with a **date of manufacture** after **October 1, 2005**, must meet the new Version 4.0 requirements in order to use the ENERGY STAR on the product or in product literature. The date of manufacture is specific to each unit, and is the date (e.g., month and year) of which a unit is considered to be completely assembled. Manufacturers may begin to test and submit products under Version 4.0 upon EPA's release of the final specification document. It is EPA's intent that all inventory of fixtures qualified prior to Version 4.0 and with a date of manufacture before October 1, 2005 will be sold by the manufacturer within six months after the effective date.
  - B. **Elimination of Automatic Grandfathering:** EPA does not allow grandfathering under this Version 4.0 specification. Therefore, any product sold, marketed, or identified by the manufacturing partner as ENERGY STAR must meet the current specification in effect at that time.
- 7) **Future Specification Revisions:** ENERGY STAR reserves the right to change the specification should technological and/or market changes affect its usefulness to consumers, industry, or the environment. In keeping with current policy, revisions to the specification will be arrived at through industry discussions.

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

**Ballast Accelerated Life Testing:** To further guarantee that electronic ballasts achieve their potential life, EPA intends to work with industry to develop and implement a ballast accelerated life test requirement in future revisions of the specification.

**Line-Voltage Socket Standardization:** EPA has worked with industry to develop a line-voltage socket standard design for use in residential lighting fixtures for ballasts that drive lamps 26 watts and lower. Under this Version 4.0 specification the use of this standard design is voluntary for compliance with ENERGY STAR. EPA encourages manufacturers to adopt this standard design for use with replaceable ballasts and intends to include a standard line-voltage socket requirement in future specification revisions (e.g V4.1).

Specific technical details are located at:

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