ENERGY STAR® Program Requirements for Residential Light Fixtures

Partner Commitments

Commitment

The following are the terms of the ENERGY STAR Partnership Agreement as it pertains to the manufacturing of ENERGY STAR qualified residential light fixtures. The ENERGY STAR Partner must adhere to the following program requirements:

- comply with current ENERGY STAR Eligibility Criteria, defining the performance criteria that must be met for use of the ENERGY STAR certification mark on residential light fixtures and specifying the testing criteria for residential light fixtures. EPA may, at its discretion, conduct tests on products that are referred to as ENERGY STAR qualified. These products may be obtained on the open market, or voluntarily supplied by Partner at EPA's request;

- comply with current ENERGY STAR Logo Use Guidelines, describing how the ENERGY STAR labels and name may be used. Partner is responsible for adhering to these guidelines and for ensuring that its authorized representatives, such as advertising agencies, dealers, and distributors, are also in compliance;

- qualify at least one ENERGY STAR labeled residential light fixture model within one year of activating the residential light fixtures portion of the agreement. When Partner qualifies the product, it must meet the specification (e.g., Tier 1 or 2) in effect at that time;

- provide clear and consistent labeling of ENERGY STAR qualified residential light fixtures. The ENERGY STAR label must be clearly displayed on the product packaging, in product literature (i.e., user manuals, spec sheets, etc.), and on the manufacturer's Internet site where information about ENERGY STAR qualified models is displayed;

- provide ENERGY STAR sales training to all sales staff. This training shall include: a) identification of ENERGY STAR labeled products within the store, b) tips for selling ENERGY STAR labeled products, and c) tips for answering questions about ENERGY STAR;

- provide to EPA, on an annual basis, an updated list of ENERGY STAR qualifying residential light fixture models. Once the Partner submits its first list of ENERGY STAR labeled residential light fixture models, the Partner will be listed as an ENERGY STAR Partner. Partner must provide annual updates in order to remain on the list of participating product manufacturers;

- for each qualifying residential light fixture model, provide to EPA test data to certify that the fixture has met the required safety acceptance and performance tests. EPA will only add models to its Qualifying Product List after reviewing and approving the product test results;

- provide to EPA, or its agents, on an annual basis, unit shipment data or other market indicators to assist in determining the market penetration of ENERGY STAR. Specifically, Partner must submit the total number of ENERGY STAR qualified residential light fixtures shipped (in units by model) or an equivalent measurement as agreed to in advance by EPA and Partner. Partner is also encouraged to provide ENERGY STAR qualified unit shipment data segmented by meaningful product characteristics (e.g., capacity, size, speed, or other as relevant), total unit shipments for each model in its product line, and percent of total unit shipments that qualify as ENERGY STAR. The data for each calendar year should be submitted to EPA, or its agents, preferably in

electronic format, no later than the following March and may be provided directly from the Partner or through a third party. The data will be used by EPA only for program evaluation purposes and will be closely controlled. If requested under the Freedom of Information Act (FOIA), EPA will argue that the data is exempt. Any information used will be masked by EPA so as to protect the confidentiality of the Partner;

- notify EPA of a change in the designated responsible party or contacts for residential light fixtures within 30 days.

Performance for Special Distinction

In order to receive additional recognition and/or support from EPA for its efforts within the Partnership, the ENERGY STAR Partner may consider the following voluntary measures and should keep EPA informed on the progress of these efforts:

- consider energy efficiency improvements in company facilities and pursue the ENERGY STAR label for buildings;

- purchase ENERGY STAR labeled products. Revise the company purchasing or procurement specifications to include ENERGY STAR. Provide procurement officials' contact information to EPA for periodic updates and coordination. Circulate general ENERGY STAR labeled product information to employees for use when purchasing products for their homes;

- ensure the power management feature is enabled on all ENERGY STAR qualified monitors in use in company facilities, particularly upon installation and after service is performed;

- provide general information about the ENERGY STAR program to employees whose jobs are relevant to the development, marketing, sales, and service of current ENERGY STAR labeled product models;

- feature the ENERGY STAR label(s) on Partner Web site and in other promotional materials. If information concerning ENERGY STAR is provided on the Partner Web site as specified by the ENERGY STAR Web Linking Policy (this document can be found in the Partner Resources section on the ENERGY STAR Web site at www.energystar.gov), EPA may provide links where appropriate to the Partner Web site;

- provide a simple plan to EPA outlining specific measures Partner plans to undertake beyond the program requirements listed above. By doing so, EPA may be able to coordinate, communicate, and/or promote Partner's activities, provide an EPA representative, or include news about the event in the ENERGY STAR newsletter, on the ENERGY STAR Web pages, etc. The plan may be as simple as providing a list of planned activities or planned milestones that Partner would like EPA to be aware of. For example, activities may include: (1) increase the availability of ENERGY STAR labeled products by converting the entire product line within two years to meet ENERGY STAR guidelines; (2) demonstrate the economic and environmental benefits of energy efficiency through special in-store displays twice a year; (3) provide information to users (via the Web site and user's manual) about energy-saving features and operating characteristics of ENERGY STAR qualified products, and (4) build awareness of the ENERGY STAR Partnership and brand identity by collaborating with EPA on one print advertorial and one live press event;

- provide quarterly, written updates to EPA as to the efforts undertaken by Partner to increase availability of ENERGY STAR qualified products, and to promote awareness of ENERGY STAR and its message.

ENERGY STAR® Program Requirements for Residential Light Fixtures

Eligibility Criteria

Below is the product specification (Version 3.0) for ENERGY STAR qualified residential light fixtures. A product must meet all of the identified criteria if it is to be qualified as ENERGY STAR by its manufacturer.

Scope:

The ENERGY STAR residential light fixture specification covers the requirements for indoor and outdoor light fixtures intended primarily for residential type applications. Residential applications include single-family and multi-family dwellings (such as houses and apartments), dormitories, assisted-living facilities and hotels.

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 outdoor motion-sensors and daylight-sensors.

1) Definitions: Below is a brief description of related terms as relevant to ENERGY STAR.

   A. 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, to position and protect the lamps and to connect the lamps to the power supply.

   B. Lamp: A generic term for a manufactured source of light. By extension, the term is also used to denote sources that radiate in regions of the spectrum adjacent to the visible.

   C. Compact Fluorescent Lamp: Multitube or multibend single-ended lamps.

   D. Linear Fluorescent Lamp: Straight or U-bent double-ended lamps.

   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. Input Power: The actual total power used by all the lamps and ballast(s) of the light fixture when operating, measured in watts (W).

   G. Lamp Current Crest Factor: Ratio of peak current to the root mean square (RMS) lamp current.

   H. Ballast Frequency: The frequency at which the ballast operates the lamp, measured in Hertz (Hz) or kilohertz (kHz).

   I. 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.

   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. NFPA: The National Fire Protection Association (United States) develops the National Electrical Code (NEC).

L. NVLAP: National Voluntary Laboratory Accreditation Program.

M. A2LA: American Association for Laboratory Accreditation.

N. OSHA: Occupational Safety & Health Administration.

O. NRTL: Nationally Recognized Testing Laboratory Program, which is a part of OSHA's Directorate of Technical Support.

P. MRA: Mutual Recognition Arrangement.

Q. ILAC: International Laboratory Accreditation Cooperation.

R. ANSI: American National Standards Institute.

S. IESNA: Illuminating Engineering Society of North America.

T. CIE: Commission Internationale de l'Eclairage.

U. UL: Underwriter Laboratories.

2) Qualifying Products: For the purposes of ENERGY STAR, a residential light fixture is a light fixture used primarily, although not exclusively, for the home. These fixtures can also be found at hotels, public or military housing, university dormitories and some light-commercial 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 **outdoor fixtures** can be found in either Table 2A (Light Source) or Table 2B (Operating Time).

Table 1 - Indoor Fixtures

Performance Characteristic	**ENERGY STAR Specification**
System Efficacy, per lamp ballast combination, expressed in Lumens Per Watt (LPW) *(see reference formula, Section 4, below)* All Fixture Types (magnetic or electronic): Below 30 listed lamp watts All Fixture Types (magnetic or electronic): ≤ 24 inches and ≥ 30 listed lamp watts Linear Lamp Fixtures (electronic ballasts required), ≥ 24 inches and ≥ 30 listed lamp watts	 ≥ 46 LPW ≥ 60 LPW ≥ 70 LPW
Power Factor	≥ 0.5
Lamp Current Crest Factor	≤ 1.7 Per ANSI C82.11-5.6.1
Lamp Start Time	The time needed after switching on the lamp to start continuously and remain lighted, must be an average of one second or less. For manufacturers using magnetic ballasts and rapid start lamps with integrated electronic starting chips, lamps must be included with fixtures when shipped from the factory.

Lamp Life	For lamps supplied with fixture, average rated life must be ≥ 10,000 hours. Lamp life must be tested in accordance with IESNA LM-40; LM-65. A test report from a NVLAP or A2LA accredited laboratory must be submitted by the Partner to EPA upon request. For fixtures that do not include lamps, the fixture package must provide a list of lamp types, that, when used with the fixture, result in the fixture complying with the specification. This list must be clearly visible to the consumer on the fixture packaging.
Color Quality	
Lamp Color Rendering	Color Rendering Index ≥ 80 for compact fluorescent lamps (multitube or multibend single-ended lamps). Color Rendering Index ≥ 75 for linear lamps (Straight or U-bent double-ended lamps). For fixtures that do not include lamps, the fixture package must provide a list of lamp types, that, when used with the fixture, result in the fixture complying with the specification. This list must be clearly visible to the consumer on the fixture packaging.
Correlated Color Temperature	For fixtures that include lamps, if the product does not have a *rated* color temperature of 2700K or 3000K (*actual measured* CCT of 2700 to 3000K ± 200K), the packaging should clearly describe the color of the product (cool or warm) and state the intended use for the product.
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.
Noise	Class A sound rating. See Footnote 2.
Warranty for defects in material and manufacturing	Repair or replacement of defective parts of the fixture housing or electronics (except lamp) for 2 years from the date of purchase. Written warranty must be included with fixture when purchased.

Durability	Requirement and testing protocol are currently under development and will be sent out for comments at a later date. Durability testing of ENERGY STAR light fixtures may include on-off cycling, voltage variations and current variations, among other factors.
Safety	Fixtures must be tested and listed by an OSHA NRTL as acceptable for compliance with NFPA 70, National Electrical Code (NEC).
Portable Fixtures	Portable fixtures must be tested and listed in accordance with ANSI/UL 153.
Hardwired Fixtures	Hardwired fixtures must be tested and listed in accordance with UL 1598.
Ballasts and "fluorescent adapters" (as defined by UL 1993)	All ballasts and "fluorescent adapters" must be recognized or listed with ANSI/UL 935 and UL 1993 respectively.
Performance Characteristics for Fluorescent Ballasts	
General	Per ANSI C82.11-5 (all parts)
Operating Temperature	Per ANSI C82.11-7.2
Electromagnetic and Radio Frequency Interference	Per FCC 47 CFR Part 18.305 and 18.307
Ballast Frequency	60Hz or 20 to 33 kHz or $\geq$ 40 kHz
Transient Protection	Per ANSI/IEEE C 62.41, Category A, 7 strikes
End of Life Protection	Required for all T5 and smaller lamps. Manufacturer must submit an engineering description outlining the scheme that is used to achieve the end of life function within the ballast. For more information visit the NEMA Web site at: www.nema.org/products/div2/white_papers.html or contact NEMA directly.

Table 2A - Outdoor Fixtures: Light Source

Performance Characteristics	ENERGY STAR Specification
Maximum input power	150 watts
System Efficacy, Lumens Per Watt (LPW) up to 70 listed lamp watts 70 to 150 listed lamp watts	 ≥ 40 LPW ≥ 50 LPW
Mechanical	Lamp holder will operate only lamps that perform to the input power range of the fixture.
Operating Characteristics:	
Re-set	Resets automatically to automatic mode within 24 hours of a manual override or testing operation.
Shut-off	Automatic shut-off during daylight hours.
Warranty for defects in materials and manufacturing	Repair or replacement of defective parts of the fixture housing or electronics (except lamp) for 2 years from the date of purchase. Written warranty must be included with fixture when purchased.
Safety	Fixtures must be tested and listed by an OSHA NRTL as acceptable for compliance with NFPA 70, National Electrical Code (NEC), including listing for damp or wet locations (Articles 410-4a and Article 100).

Table 2A Special Application - Outdoor Fixtures: With A Controlled Circuit

Shut-off	Automatic shut-off during daylight hours via controlled circuit. For fixtures sold without individual photocells, the package must include the following language next to the ENERGY STAR label "This product is ENERGY STAR qualified only when installed on a photocell controlled circuit."

Table 2B - Outdoor Fixtures: Operating Time

Performance Characteristics	ENERGY STAR Specification
Maximum Lamp Input Power Shut-off	250 watts Automatic shut-off during daylight hours; and automatic shut-off within a maximum of 15 minutes of either a manual on signal, or no motion in the fixture's field of view.
Operating Characteristics: Re-set	 Resets automatically to automatic mode within 24 hours of a manual override or testing operation.
Warranty for defects in materials and manufacturing	Repair or replacement of defective parts of the fixture housing or electronics (except lamp) for 2 years from the date of purchase. Written warranty must be included with fixture when purchased.
Safety	Fixtures must be tested and listed by an OSHA NRTL as acceptable for compliance with NFPA 70, National Electrical Code (NEC), including listing for damp or wet locations (Articles 410-4a and Article 100).

4) Test Procedures, Reference Standards and Required Documentation: To qualify a residential lighting fixture as ENERGY STAR, it must be tested according to the protocol outlined below. Documentation for each of the performance characteristics listed in Table 3 (Reference Standards and Required Documentation) must accompany the ENERGY STAR Residential Light Fixture Qualified Product Information Form. Required laboratory documentation, test procedures, and reference standards are also outlined below in Table 3.

General Testing and Documentation Protocol

- ENERGY STAR qualified residential light fixtures must be tested, listed, and/or labeled by an organization accredited by
    1. the NVLAP and/or one of its MRA signatory partners, including the A2LA, for the appropriate performance requirements,
    2. an OSHA NRTL for the appropriate safety requirements.

  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.
  For a list of A2LA accredited laboratories, visit the A2LA Web site at www.a2la.org or call (301) 644-3248.
  For a list of accredited OSHA NRTLs visit their Web site at http://www.osha-slc.gov/dts/otpca/nrtl/index.html or call (202) 693-2110.
- Partners must submit appropriate documentation as listed in Table 3 – Reference Standards and Required Documentation.

- ENERGY STAR partners (fixture manufacturers) may either:
    1. Have products tested by NVLAP or A2LA accredited lab, or by an OSHA NRTL as appropriate.
    2. Obtain, from original equipment manufacturer, test reports from NVLAP or A2LA accredited lab or by an OSHA NRTL as appropriate.
    3. Obtain test reports from laboratories accredited by an ILAC MRA signatory.
- Laboratory test documentation must be submitted along with a signed copy of the ENERGY STAR Residential Light Fixture Qualified Product Information Form. Visit the ENERGY STAR Web site at www.energystar.gov/library under "ENERGY STAR for Products" for the latest version.
- Multiple fixture models can use the same lamp/ballast combination. Only one set of test results is required for each lamp/ballast combination.
- The sample size required to qualify a residential light fixture as ENERGY STAR is 3 units per individual lamp/ballast combination.
- At EPA's discretion EPA can require additional documentation to determine compliance with all performance criteria outlined in Tables 1, 2A or 2B.

Table 3 – Reference Standards and Required Documentation

Performance Characteristic		**Methods of Measurement Reference Standards**	**Performance Characteristic Reference Standards**	**Required Documentation** (to be attached to Qualified Product Information Form)
Efficacy	Light Output	IESNA LM-9; LM-66 See Footnote 1	Refer to Table 1, 2A or 2B above as appropriate	Test report from a laboratory accredited by NVLAP or a laboratory accredited by an ILAC MRA signatory.
	Input Power	IESNA LM-9; LM-66; ANSI C82.2 See Footnote 1	Refer to Table 1, 2A or 2B above as appropriate	Test report must come from a laboratory accredited by NVLAP or a laboratory accredited by an ILAC MRA signatory or from an OSHA NRTL. See Footnote 5
Power Factor		ANSI C82.11-3.3.1	Refer to Table 1, round to nearest tenth	Test report must come from a laboratory accredited by NVLAP or a laboratory accredited by an ILAC MRA signatory or from an OSHA NRTL. See Footnote 5

Lamp Current Crest Factor	ANSI C82.11-3.3.3	ANSI C82.11-5.6.1	Test report must come from a laboratory accredited by NVLAP or a laboratory accredited by an ILAC MRA signatory or from an OSHA NRTL. See Footnote 5
Lamp Start Time	ANSI C82.11-5.2	Refer to Table 1, 2A or 2B above as appropriate	Test report must come from a laboratory accredited by NVLAP or a laboratory accredited by an ILAC MRA signatory or from an OSHA NRTL. See Footnote 5
Lamp Life	IESNA LM-40; LM-65	Refer to Table 1, 2A or 2B as appropriate	Test report must come from a laboratory accredited by NVLAP or a laboratory accredited by an ILAC MRA signatory or from an OSHA NRTL. See Footnote 5
Lamp Color Rendering	IESNA LM-58; CIE 13.I	Refer to Table 1, 2A or 2B above as appropriate	Test report must come from a laboratory accredited by NVLAP or a laboratory accredited by an ILAC MRA signatory.
Lamp Correlated Color Temperature	IESNA LM-58; LM-16	Refer to Table 1, 2A or 2B above as appropriate	Test report must come from a laboratory accredited by NVLAP or a laboratory accredited by an ILAC MRA signatory.

Dimming	No Standard Available (Use manufacturer protocol)	Refer to Table 1, 2A or 2B above as appropriate	Manufacturer or Lab Data
Warranty	No Standard Available (Use manufacturer protocol)	Refer to Table 1, 2A or 2B above as appropriate	Manufacturer written warranty
Durability Test	Currently Under Development		
Safety – Portable Fixtures	ANSI/UL 153	ANSI/UL 153	OSHA NTRL Test report
Safety – Hardwired Fixtures	UL 1598	UL 1598	OSHA NTRL Test report
Safety – Ballasts and "Fluorescent Adapters"	ANSI/UL 935; UL 1993	ANSI/UL 935; UL 1993	OSHA NTRL Test report
Ballast Frequency	IESNA LM-28	Refer to Table 1, 2A or 2B above as appropriate	Test report must come from a laboratory accredited by NVLAP or a laboratory accredited by an ILAC MRA signatory or from an OSHA NRTL. See Footnote 5
Transient Protection	IEEE C 62.41	IEEE C 62.41, Category A, 7 Strikes	Test report must come from a laboratory accredited by NVLAP or a laboratory accredited by an ILAC MRA signatory or from an OSHA NRTL. See Footnote 5
End of Life Protection	See Footnote 3	See Footnote 3	See Footnote 3
Electromagnetic and Radio Frequency Interference	See Footnote 4	See Footnote 4	See Footnote 4

FOOTNOTE 1:

Efficacy shall be determined by the following equation:

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

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

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

For fixtures shipped without lamps, efficacy shall be determined using an "off the shelf" lamp; at least one of the lamp types listed on the fixture package.

FOOTNOTE 2:

Magnetically and electronically-ballasted fixtures must be Class A-rated, meaning the fixture does not exceed a measured level of 24dBA (audible) when measured with a sound meter (similar in performance to B&K type 2209) where the microphone is located 12 inches from the fixture in any direction.

FOOTNOTE 3:

For fixtures using T5 or smaller lamps, manufacturer must submit an engineering description outlining the scheme that is used to achieve the end of life function within the ballast. For more information visit the NEMA Web site at www.nema.org/products/div2/white_papers.html or contact NEMA directly.

FOOTNOTE 4:

EPA expects manufacturers to comply with FCC requirements. However, EPA will not play an active role in verifying compliance, unless technical problems arise. At that point EPA can request data from manufacturers, and/or turn any enforcement of FCC rules directly over to FCC.

FOOTNOTE 5:

Accredited laboratories are typically able to provide this measurement although the lab may not be accredited for this specific test method. ENERGY STAR will accept test reports with these results.

5) Effective Date: The date that manufacturers may begin to qualify products as ENERGY STAR will be defined as the *effective date* of the agreement. The ENERGY STAR for Residential Light Fixtures (Version 3.0) specification is **effective on July 2, 2001**, and replaces all previous versions when signed. Manufacturer agrees to submit all products qualifying under the above ENERGY STAR (Version 3.0) specification no later than six months after signing of this Agreement. **Products meeting the former ENERGY STAR (Version 2.1) specification must be re-submitted by April 1, 2002 in order to remain qualified**.

6) 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.

Phase-out of Magnetic Ballasts: Linear fluorescent fixtures with a magnetic ballast and lamps greater than 24 inches in length and over 30 listed lamp watts, no longer qualify for ENERGY STAR. For these fixtures to qualify for ENERGY STAR they must use an electronic ballast. All other fixtures may continue to use a magnetic or an electronic ballast at this time. However, it is EPA's intent that future ENERGY STAR residential light fixture technical specifications require ALL fixtures to use electronic ballasts.

Potential Revisions for Durability Testing: Within six months from the start date of this Partnership Agreement, EPA will sponsor an industry meeting to discuss issues regarding life testing of lamp and ballast combinations in ENERGY STAR qualified fixtures. The intent of this meeting will be to begin development of a technical specification for durability testing of ENERGY STAR qualified light fixtures, that may include on-off cycling, voltage variations and current variations, among other factors, to quickly and accurately evaluate durability of ENERGY STAR products in residential applications.