



ENERGY STAR® Program Requirements for CFLs Partner Commitments

FINAL VERSION: 8/19/01

Eligible Organizations: Manufacturers of Compact Fluorescent Light Bulbs

Commitment

The following are the terms of the ENERGY STAR Partnership Agreement as it pertains to the manufacturing of ENERGY STAR qualified CFLs. 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 CFLs and specifying the testing criteria for CFLs. DOE 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 DOE'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 CFL model within one year of activating the CFLs portion of the agreement. When PARTNER qualifies the product, it must meet the specification in effect at that time;
- Provide clear and consistent labeling of ENERGY STAR qualified CFLs. The ENERGY STAR label must be clearly displayed on product packaging, on the Partner's Internet site where information about ENERGY STAR qualified models is displayed, and in product literature (i.e., user manuals, spec sheets, etc.). It is also recommended that the label appear on the on the top/front of the product;
- Provide to DOE, on an annual basis, an updated list of ENERGY STAR qualifying CFL models. Once the PARTNER submits its first list of ENERGY STAR labeled CFL models, the PARTNER's company name will be listed as an ENERGY STAR PARTNER (<http://www.energystar.org/cflpartners.asp>). PARTNER must provide annual updates in order to remain on the list of participating product manufacturers;
- For each qualifying CFL model, provide to DOE test data to certify that the lamps and lamp systems have met the required safety acceptance and performance tests. DOE will only add models to its Product List after reviewing and approving the product test results;
- Provide to DOE, 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 CFLs shipped (in units by model) or an equivalent measurement as agreed to in advance by DOE and PARTNER. PARTNER is also encouraged to provide ENERGY STAR qualified unit shipment data segmented by meaningful product characteristics (e.g. bulb type/style) 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 DOE, 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 DOE only for program evaluation purposes and will be closely controlled. If requested under the Freedom of Information Act (FOIA), DOE will argue that the data is exempt. Any information used will be masked by DOE so as to protect the confidentiality of the PARTNER;
- Notify DOE of a change in the designated responsible party or contacts for CFLs within 30 days

Performance for Special Distinction

In order to receive additional recognition and/or support from DOE for its efforts within the Partnership, the ENERGY STAR PARTNER may consider the following voluntary measures and should keep DOE 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 DOE 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, DOE may provide links where appropriate to the PARTNER web site;
- Provide a simple plan to DOE outlining specific measures PARTNER plans to undertake beyond the program requirements listed above. By doing so, DOE may be able to coordinate, communicate, and/or promote PARTNER's activities, provide a DOE 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 DOE 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 DOE on one print advertorial and one live press event;
- Provide quarterly, written updates to DOE 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 CFLs
ENERGY STAR® Eligibility Criteria
Energy-Efficiency Specification

Below is the product specification for ENERGY STAR qualified Compact Fluorescent Light Bulbs (CFLs). A product must meet all of the identified criteria if it is to be labeled as ENERGY STAR by its manufacturer.

- 1) **Scope:** This ENERGY STAR CFL specification covers the requirements for self-ballasted, screw-based CFLs and lamp systems, comprising:
- A. Single-based, bare compact fluorescent lamps with integral electronic ballasts;
 - B. Circle and square lamps with a maximum diameter of 9 inches or a maximum side length of 8 inches and having electronic ballast adapters that are tested and packaged with the lamp.
 - C. Single based compact fluorescent lamps with integral electronic ballasts and which have a translucent cover over the bare fluorescent tube. The cover may be globe, bullet, pear or other shape.
 - D. Single based compact fluorescent lamps with integral electronic ballasts and which have a reflector that may be open or enclosed. The lamp shall be primarily intended to replace wide beam incandescent reflector lamps.

The intent of this ENERGY STAR program is to move consumers from incandescent to energy efficient compact fluorescent lighting. ENERGY STAR qualified compact fluorescent lamps are primarily intended for residential applications.

2) **Definitions:**

- A. Self-ballasted compact fluorescent lamp – A compact fluorescent lamp unit that incorporates, permanently enclosed, all elements that are necessary for the starting and stable operation of the lamp, and which does not include any replaceable or interchangeable parts.
- B. Rated voltage – The voltage marked on the lamp.
- C. Rated wattage – The wattage marked on the lamp.
- D. Rated supply frequency – The frequency marked on the lamp.
- E. Initial performance values – The photometric and electrical characteristics at the end of the 100-hour aging period.
- F. Rated luminous flux – Initial lumen rating declared by the manufacturer.
- G. Lumen maintenance – The luminous flux at a given time in the life of the lamp and expressed as a percentage of the initial luminous flux. The mean lumens are the value at 40% of rated life.
- H. Average rated lamp life – The length of time declared by the manufacturer during which 50% of any large number of lamps reaches the end of their individual lives.
- I. Lamp color – The color characteristics of a lamp as defined by the color appearance and the color rendition.
- J. Color appearance – The actual color of the lamp is called the color appearance and is defined in terms of the spectral tri-stimulus values (color coordinates) according to the recommendations of the CIE Publication No. 13.3 – 1995. For color coordinates near the black body loci, the correlated color temperature (Kelvin) can be used to define color appearance.
- K. Color rendition – The effect the spectral characteristic of the light emitted by the lamp has on the color appearance of the objects illuminated by it is called color rendition. The color rendering index is defined in terms of a comparison of the spectral tri-stimulus values of the objects under test illumination and standard illumination according to the recommendations of CIE Publication No. 13.3-1995
- L. Starting time – The time needed after switching on for the lamp to start fully and remain lighted.
- M. Run-up time – The time needed after switching on the supply for the lamp to reach 80% of its stabilized luminous flux.
- N. Starting temperature – The minimum and maximum temperatures at which the lamp will reliably start.
- O. Power factor – The active power divided by the apparent power (i.e. product of the rms input voltage and rms input current of a ballast).
- P. Private labeler – Company who uses its own brand name on a product manufactured by a third party.

3) **Reference Standards:** ENERGY STAR qualified compact fluorescent lamps and lamp systems shall comply with the relevant clauses of the following standards, unless the requirements of the ENERGY STAR specification are more restrictive:

| | |
|---------------------------------|---|
| ANSI C78.1 – 1991 | <i>Fluorescent Lamps – Rapid-Start Types</i> |
| ANSI C78.4 – 1995 | <i>Fluorescent Lamps – Self-Supporting Single-Based Compact Types</i> |
| ANSI C78.5 – 1997 | <i>Specifications for Performance of Self-Ballasted Compacted Fluorescent Lamps</i> |
| ANSI C78.375 – 1997 | <i>Guide for Electrical Measurements of Fluorescent Lamps</i> |
| ANSI/IEEE C62.41 – 1991 | <i>Surge Voltages in Low-Voltage AC Power Circuits, Recommended Practice for</i> |
| CIE Publication No. 13.3 – 1995 | <i>Method of Measuring and Specifying Color Rendering of Light Sources</i> |
| IESNA LM-9 – 1998 | <i>Electric & Photometric Measurement of Fluorescent Lamps</i> |
| IESNA LM-40 – 1987 | <i>Approved Method for Life Performance Testing of Fluorescent Lamps</i> |
| IESNA LM-65 – 1991 | <i>Life Testing of Single-ended Compact Fluorescent Lamps</i> |
| IESNA LM-66 – 1991 | <i>Electrical and Photometric Measurements of Single-Compact Fluorescent Lamps</i> |
| UL 1993 – 1993 | <i>Standard for Self-Ballasted Lamps and Lamp Adapters</i> |

ENERGY STAR qualified compact fluorescent lamps and lamp systems shall comply as applicable with the labeling requirements of the U.S. Federal Trade Commission (16 CFR Part 305.1-.18) and the EMI requirements of the U.S. Federal Communications Commission located under 47 CFR Part 18.

4) CFL Requirements for Testing

| Photometric Performance Requirements | | | | |
|---|---|---|---|-----------------------|
| Specification Item | ENERGY STAR Requirement | Sample Size | Laboratory Requirement | Submittal Time |
| Lamp Power (Watts) & Configuration ¹ | Minimum Efficacy: Lumens/watt (Based upon initial lumen data ²) | A minimum of five (5) lamps tested in the <u>base up</u> position unless the product is labeled as a position-restricted by the manufacturer. If position restricted, test lamps in specified position. | Must use a lab accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) ³ . | Pre-qualification |
| <u>Bare lamp:</u> Lamp power <15 Lamp power ≥15 | 45.0 60.0 | | | |
| <u>Covered lamp (no reflector)</u> Lamp power <15 15 ≤ lamp power <19 19 ≤ lamp power <25 Lamp power ≥ 25 | 40.0 48.0 50.0 55.0 | | | |
| <u>W/Reflector:</u> Lamp power <20 Lamp power ≥20 | 33.0 40.0 | | | |
| 1,000-hour Lumen Maintenance | The average of at least 5 lamps must be a minimum 90% of initial (100-hour) lumen output @ 1,000 hours of rated life. | | | |
| Color Quality (CRI) | Average of samples tested must be > 80.0 | | | |
| Correlated Color Temperature | Between 2700K and 3000K. If not, packaging should clearly state temperature and color of product (cool or warm) | | | |
| Lumen Maintenance | 80% of initial (100-hour) rating at 40% of rated life (Per ANSI C78.5, Clause 4.10) | A minimum of five (5) lamps tested in the <u>base up</u> position unless the product is labeled as a position-restricted by the manufacturer. If position restricted, test lamps in specified position. | NVLAP only | Interim qualification |

¹ Take performance and electrical requirements at the end of the 100-hour aging period according to ANSI C78.5. The lamp efficacy shall be the average of the lesser of the lumens per watt measured in the base up an/or other specified positions. Use wattages placed on packaging to select proper specification efficacy in this table, not measured wattage. Labeled wattages are for reference only.

² Efficacies are based on measured values for lumens and wattages from pertinent test data. Wattages and lumens placed on packages may not be used in calculation and are not governed by this specification. For multi-level or dimmable systems, measurement shall be at the highest setting. Acceptable measurement error is +/- 3%.

³ For a list of NVLAP accredited labs, visit www.ts.nist.gov/nvlap

⁴ Self-certification is a declaration of conformance by the manufacturer to the requirement. For self-certification where data are required (sample size is specified in the requirement), the manufacturer may use data obtained directly from the manufacturer's own facilities that are neither NVLAP or A2LA accredited.

| Electrical Performance Requirements ⁶ | | | | |
|--|---|---|---|---------------------------------|
| Specification Item | ENERGY STAR Requirement | Sample Size | Laboratory Requirement | Submittal Time |
| Power Factor | ≥ 0.50 | A minimum of five (5) lamps tested in the <u>base up</u> position unless the product is labeled as a position-restricted by the manufacturer. If position restricted, test lamps in specified position. | Use NVLAP or A2LA ⁴ accredited labs | Pre- Qualification |
| Run-up Time | ≤ 3.0 minutes per ANSI C78.5, clause 3.11 and 4.8 | | | |
| Starting Time | Time after switching on until full start (and remain lighted) shall be an average of ≤ 1.0 second | | | |
| Transient Protection | Per ANSI/IEEE C62.41, Category A, 7 strikes | A minimum of five (5) lamps tested in the <u>base up</u> position unless the product is labeled as a position-restricted by the manufacturer. If position restricted, test lamps in specified position. <i>Must be unique sample for this test only</i> | Use NVLAP or A2LA ⁴ accredited labs or manufacturer may self test and self certify | |
| Operating Frequency | ≥ 40.0 kHz | Determined by Test Lab | FCC laboratory or manufacturer's laboratory ⁷ | |
| Electromagnetic Interference | Compliance with FCC 47 CFR Part 18 requirements for consumer limits | | | |
| Base | Medium screw E26/24 | Self-certification | | Labeling / Package Review |
| Starting Temperature | Package must declare the minimum starting temperatures or geographical zone of use and any other conditions (e.g. use in enclosed luminaire) for reliable starting to meet the starting time requirements of ANSI C78.5, Clause 4.7 | | | |
| Compatibility with Controls | Lamp package shall clearly state any known incompatibility with photo controls, dimmers or timing devices. | | | |

⁵Find a list of American Association for Laboratory Accreditation (A2LA) at www.a2la.org

⁶ Input voltage must be 120 V and frequency must be 60 Hz

⁷ Laboratory must be listed on FCC Office of Engineering & Technology web site, and with either NVLAP or A2LA accreditation.

| Lifetime Performance Requirements | | | | |
|---|--|---|--|--|
| Specification Item | ENERGY STAR Requirement | Sample Size | Laboratory Requirement | Submittal Time |
| Warranty <i>(applicable to normal residential use)</i> | At least 12 months from date of purchase, and an "800" number or address for consumer complaint resolution. | Self-certification | | Pre-qualification; Labeling / Package Review |
| Labeling | In English, or English with additional languages. Label must meet FTC 16CFR Part 305.1-.18. ⁸ Inclusion of an incandescent equivalence is optional. ⁹ | | | |
| Rapid Cycle Stress Test | Per ANSI C78.5 and IESNA LM-65 (clauses 2,3,5, and 6) <i>exception</i> : cycle times must be 5 minutes on, 5 minutes off. Lamp will be cycled once for every two hours of rated life. At least 5 lamps must meet or exceed the minimum number of cycles. | 6 units, base up or down as stated by manufacturer, <i>must be unique sample for this test only</i> | NVLAP, A2LA, or ISO9000 certified laboratories or facilities | Pre-Qualification |
| Interim Life Test | @ 40% of rated life report on lamp life: <ul style="list-style-type: none"> • One failure, acceptable • Two failures, requires justification • Three failures, immediate de-listing | 10 units per model, 5 base up/ 5 base down, unless specific use or position appears on packaging | | Interim qualification |
| Average Rated Lamp Life | ≥ 6,000 hours as declared by the manufacturer on packaging. At 80% of rated life, statistical methods may be used to confirm lifetime claims based on sample performance. | | | Final Qualification @ 80% of rated life or at completion of rated life |

⁸For information on how CFLs must comply with the FTC's Appliance labeling act, visit www.ftc.gov/bcp/online/edcams/appliances/biz.htm.

⁹ If displaying an incandescent equivalence for commonly used A-shaped bulbs, the CFL's initial luminous flux must meet the following levels. The table shows typical luminous flux for A-shaped, soft white, incandescent bulbs. Based on research conducted by NLRPIIP (www.lrc.rpi.edu/NLRPIIP/Online/index.html), luminous flux varies considerably among bulbs. The table below is intended to aid in consumer choice and in no way supercedes or replaces any requirement for product performance contained in this specification. If the luminous flux falls outside of the range, either do not display an incandescent equivalence or display the lower incandescent wattage equivalence. If displaying an incandescent equivalent for Globe, Reflector, or Decorative type bulbs, the initial luminous flux for both the CFL and the appropriate Globe, Reflector, or Decorative incandescent bulb must be displayed side by side in a comparison panel, along with the wattage ratings for both the CFL and incandescent bulb.

| A-Shaped Incandescent bulb (Watts) | Typical Luminous Flux (Lumens) [†] [†] Lumens must be 100 hr, initial values for CFLs |
|------------------------------------|---|
| 40 | Minimum of 450 |
| 60 | Minimum of 800 |
| 75 | Minimum of 1,100 |
| 100 | Minimum of 1,600 |
| 150 | Minimum of 2,600 |

| Referenced Standards/Procedures | | |
|---------------------------------|---|---------------|
| Performance Characteristics | Test Procedure | |
| | Compact Fluorescent (<i>see note below</i>) | Circle design |
| Lumen Output and Efficacy | IESNA – LM66 | IESNA – LM9 |
| Lumen Depreciation and Life | IESNA – LM65 & ANSI – C78.5 | IESNA – LM40 |
| Color Rendering Index | CIE Publication 13.3 | |
| Transient Protection | ANSI/IEEE C62.41, Category A, 7 strikes | |
| Electromagnetic Interference | FCC 47 CFR Part 18 for consumer limits | |

Note: Testing with a reference ballast shall not apply to integrally ballasted compact fluorescent lamps. These lamps shall be measured with their integral ballasts at 120 volts and 60 Hz.

5) Certification: Manufacturers shall certify that ENERGY STAR qualified compact fluorescent lamps and lamp systems sold using the ENERGY STAR label have:

- 1) Been tested and third party listed to UL Standard 1993 by a Nationally Recognized Testing Laboratory (NRTL) accredited by Occupational, Safety, and Health Administration (OSHA),
- 2) Met the manufacturers' declared performance criteria,
- 3) Meet or exceed the minimum performance criteria contained in this ENERGY STAR specification for the characteristics shown above.

6) Qualification: Manufacturers have two options on how to submit their CFL for ENERGY STAR qualification.

Alternative 1: Full Qualification. Manufacturer may submit, up front, all data indicating that a new or previously tested, listed, or labeled model meets the specification. This alternative requires the submission of **completed pre-qualification photometric and electrical test results (see tables), along with the lumen maintenance and average rated life test results, but eliminates the need to conduct the 1,000-hour lumen maintenance, rapid cycle, and interim life test results.** Manufacturers' properly accredited laboratories and properly accredited third-party testing facilities must certify to the authenticity and integrity of the test data and are encouraged to complete the ENERGY STAR CFL Qualification Form to expedite the process. A model meeting these criteria will be considered fully qualified after a label/package review and will receive a letter stating they have met all necessary criteria along with special recognition on the ENERGY STAR Web Site and priority in promotions.

Alternative 2: Early Labeling. This alternative requires three testing stages, but allows the manufacturer to label the model after pre-qualification testing results have been verified.

Stage 1: Pre-Qualification -- For new models, and/or models not previously tested, listed, or labeled, manufacturers must provide data indicating that the model meets:

- All pre-qualification photometric, electrical, and life time specifications (*see tables*)
- Rapid cycle stress test
- 1,000-hour lumen maintenance

Manufacturers' properly accredited laboratories and properly accredited third-party testing facilities must certify to the authenticity and integrity of the test data and are encouraged to complete the ENERGY STAR CFL Qualification Form (available from your account manager) to expedite the process. The manufacturer will receive a confirmation of pre-qualification and may begin labeling that model thereafter. A sample label/package must be submitted for review, prior to final package printing.

Stage 2: Interim Testing -- At 40% of rated life, the manufacturer must provide an update on lamp life (quantity of lamps still operating) and the results of the lumen maintenance test from the initial population (10 samples; 5 base-up and 5 base-down). For the lamp life update, given a 10-product sample, one failure will pass, while two failures will require justification, and three failures will result in immediate de-listing. ENERGY STAR will review this data and may, upon finding cause for concern, expect a suitable corrective action plan/re-testing to be undertaken by the manufacturer. Failure to satisfy ENERGY STAR that suitable corrections are being taken may result in de-listing of that model.

Stage 3: Final Qualification – Upon completing the average rated life test or at 80% of rated life as declared on the manufacturer's packaging, the manufacturer may report the quantity of sample lamps still operating in the life test. Statistical analysis may be employed to verify final achievement of rated life claims and lumen maintenance at 80% of rated life. The average rated life test results must be submitted within eighteen months of pre-qualification. ENERGY STAR will review final qualification data and may, upon finding cause for concern, expect a suitable corrective action plan/re-testing to be undertaken by the manufacturer. Failure to satisfy ENERGY STAR that suitable corrections are being taken may result in de-listing of that model. Models meeting final qualification criteria will receive a letter stating they have met all necessary criteria along with special recognition and priority in promotions.

7.) Labeling and Product Packaging Review – Within 5 business days of receiving all appropriate test results, ENERGY STAR shall confirm that a model meets the specification and provide the manufacturer with authorization to use the ENERGY STAR certification mark. ENERGY STAR shall list the qualified model on the www.energystar.gov web site. All labeling must be in accordance with ENERGY STAR logo use guidelines found in the Partnership Agreement and online at www.energystar.gov. Packaging and promotions using the label should be submitted to ENERGY STAR for final review and approval.

8.) Private Labeling Products – Manufacturers and other ENERGY STAR partners may cross-list products by completing a Private Labeler qualification form (*available from your account manager*). The privately labeled products, or products with different model numbers, fall under the same quality assurance and de-listing protocol as the originally tested model.

9.) Quality Assurance and De-listing: Manufacturers are encouraged to participate in on-going quality control programs traceable to NVLAP or A2LA accredited facilities. The quality control programs should include random off-the-shelf testing. Evidence of participation by the manufacturer will result in expedited product qualification and benefit of the doubt in non-compliance negotiations.

Additional and/or separate off-the-shelf testing may be conducted by a NVLAP accredited facility based on complaints or other suspicion of non-compliance, or as part of a random test program. If a model fails quality control or off-the-shelf testing, ENERGY STAR may request further testing or other actions to be taken by the manufacturer to demonstrate why the product should not be de-listed from the ENERGY STAR program.

De-listing of a model may result from evidence of non-compliance with the ENERGY STAR partnership agreement and/or specification. If a product is de-listed the manufacturer must wait **six months from the date of the de-listing** to re-submit that model, qualify any other new or existing model, or private label an existing qualified model. A pattern of de-listings may result in termination of the partnership agreement.

Should a product be de-listed the manufacturer must cease use of the ENERGY STAR logo on packaging or in association with products that are de-listed starting on the day of notice from ENERGY STAR, allowing for some inventory of previously shipped products. The manufacturer is responsible for resolving any resulting issues with retailers and regional program implementers.

10.) Effective Date: The effective date for the ENERGY STAR Program Requirements for CFLs is **October 1, 2001**, and replaces all previous versions. At this time, manufacturers that qualified products that meet the former specification must submit average rated life and lumen maintenance data by their **18-month due date or by July 1, 2002** (*whichever date comes first*) in order to remain qualified. Manufacturers that have received full ENERGY STAR qualification prior to October 1, 2001, will be considered in compliance with the new Specification and therefore, do not need to submit any new testing data.

11.) 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. Within one year of the effective date of this version of the specification, ENERGY STAR will review comments and suggestions for increasing efficacy and the scope of the CFL specification.