



## IFC/GEF Efficient Lighting Initiative Compact Fluorescent Lamp Testing Guidelines

### Compact Fluorescent Lamps

Compact fluorescent lamps (CFLs) are an important energy-efficient lighting technology that are broadly promoted through the IFC/GEF Efficient Lighting Initiative (ELI). CFLs are now available in a wide variety of lamp dimensions, with various wattages, lumen outputs, efficiency levels and prices. Unfortunately, the quality of CFLs available on the global market also varies widely, posing a real risk to consumers and to the long-term growth of CFL sales.

At the request of manufacturers the “IFC/GEF Efficient Lighting Initiative Compact Fluorescent Lamp Testing Guidelines” provide details on the specific laboratory test results that must be submitted as part of a complete application for qualification under ELI. This document does not change any ELI policies or set any new requirements but restates existing requirements in a simple, condensed form. “IFC/GEF Efficient Lighting Initiative Compact Fluorescent Lamp Labeling and Warranty Guidelines” provide details on the specific documentation of compliance with ELI’s labeling and warranty requirements that should be submitted with each application. “ELI Voluntary Technical Specification for Compact Fluorescent Lamps” is the source document referred to by both “Guidelines” documents. “ELI Compact Fluorescent Lamp Application Form 2” is a simplified template that manufacturers can use to submit performance information as part of their applications. All documents are available at [www.efficientlighting.net](http://www.efficientlighting.net).

The results from the tests described here are the only laboratory results required to complete an application for qualification under ELI. Results from all tests are required, with the possible exception of the Reliability test under “Efficiency Option B” (see notes). **Results of the IEC 60969 lifetime test are not required for qualification under ELI.** To minimize costs, manufacturers are encouraged to submit relevant results from past testing whenever available. Test results will be accepted from any lighting laboratory accredited under ISO 17025, including laboratories owned or operated by lighting manufacturers.

“ELI Voluntary Technical Specification Compact Fluorescent Lamps” includes other requirements relating to CFL labeling and warranty. Guidance for these requirements is included in “IFC/GEF Efficient Lighting Initiative Compact Fluorescent Lamp Labeling & Warranty Guidelines.”

Please address all questions or comments regarding these guidelines to:

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## **ELI CFL GENERAL TESTING REQUIREMENTS**

All laboratory tests for qualification of compact fluorescent lamps (CFLs) under the IFC/GEF Efficient Lighting Initiative should be performed at lighting laboratories accredited under ISO 17025. Documentation showing ISO 17025 accreditation should be submitted with the ELI application for qualification. Tests should be performed at 25 °C and a maximum relative humidity of 65% unless indicated otherwise.

## **ELI CFL ELECTRICAL TESTING REQUIREMENTS**

### **Power**

Power drawn should be measured as defined in IEC 61000. Dimmable CFLs should be set to maximum light output. Measurements should be recorded from CFLs in the vertical base up (VBU) position after an initial burn-in period of 100 hours, at stabilized light output and current. The application value for the CFL will be calculated from the average power of each of a sample of no fewer than 10 of the same CFLs.

### **Power Factor**

Power factor measurements should be taken as defined in IEC 61000. Dimmable products should be set to maximum light output. Measurements should be recorded from CFLs in the vertical base up (VBU) position after an initial burn-in period of 100 hours, at stabilized light output and current. The application value for the product will be calculated from the average power factor of each of a sample of no fewer than 10 of the same CFLs.

### **Lamp Start**

Time to lamp start is the time that it takes a CFL to continuously illuminate after being switched on. This test does not require a measurement of luminous flux. Dimmable products should be set to maximum light output. CFLs should be in the vertical base up (VBU) position and measurements should be recorded after an initial burn-in period of 100 hours. Time to lamp start measurements should be taken when the CFL has been switched off for at least 30 minutes. The time to lamp start application value for the CFL will be calculated from the average time to lamp start of each of a sample of no fewer than 10 of the same CFLs.

### **Reliability (for ELI Voluntary Technical Specification for CFLs Efficiency Option B ONLY)**

Dimmable products shall be set to maximum light output. CFLs will be tested in the vertical base up (VBU) position. The reliability value is defined as the average number of cycles achieved by a sample of 10 of the same CFLs in a rapid cycle test of 0.5 minutes on, 4.5 minutes off until 50% sample failure.

## **ELI CFL PHOTOMETRIC TESTING REQUIREMENTS**

### **Luminous Flux**

Luminous flux measurements should be taken from CFLs in the vertical base up (VBU) position. Measurements should be recorded after an initial burn-in period of 100 hours, at stable light output and current. The luminous flux application value for the CFL will be calculated from the average luminous flux of each of a sample of no fewer than 3 of the same CFLs. (Refer to IEC 60909 Appendix A)

### **Lumen Maintenance**

Same as Luminous Flux, but after measurements made after 2000 hours of operation.



**Color Rendering**

Measurements of Color Rendering Index (CRI) should be taken from CFLs in the vertical base up (VBU) position. Measurements should be recorded after an initial burn-in period of 100 hours at stable light output and current. The CRI application value for the product will be calculated from the average luminous flux of each of a sample of no fewer than 3 of the same CFLs. (CRI as defined in IEC 60969, measured in accordance with CIE 29/2). Separate CRI measurements should be submitted for CFLs that are different color temperature versions of the same model number.

**Stabilized Light Output**

Time to stabilized light output may be reported as time taken to achieve and maintain at least 75% of rated light output. (Alternately, manufacturers may choose to provide values for time taken to achieve and maintain at least 80% of rated light output.) Dimmable products should be set to maximum wattage. All CFLs should be in the vertical base up (VBU) position and measurements should be recorded after an initial burn-in period of 100 hours. Measurement should be recorded after the CFL has been switched off for at least 30 minutes. The application value for time to stabilized light output will be calculated from the average of the results obtained from each of a sample of no fewer than 3 of the same CFLs. (measured in accordance with IEC 60969)

**ELI CFL SAFETY TESTING REQUIREMENTS**

**Safety**

Manufacturers must submit laboratory test results showing that CFLs meet all local safety requirements and the requirements of IEC 60968 for unitary CFLs and applicable parts of IEC 61199 and 60598 for modular CFLs

**Electromagnetic and Radio Frequency Interference**

Manufacturers must submit laboratory test results showing that CFLs comply with CISPR 15 or relevant local regulations.

**Transient Protection**

Manufacturers must submit laboratory test results showing that CFLs comply with IEC 61547

**Notes:**

**Power Factor:** European Union requirements for harmonics injected by electricity-using consumer appliances and lighting drawing  $\leq 25$  Watts (IEC 61000-3-2) become quite strict in 2001. These requirements will impose costs on manufacturers and consumers and possibly have a negative impact on the reliability of CFLs. Therefore, in ELI participant countries that are candidates for EU integration (Latvia, Hungary and the Czech Republic) CFLs are required to comply with IEC 61000-3-2 in order to qualify for participation in ELI. CFLs for sale in Argentina, Peru, Philippines and South Africa may qualify if they meet a minimum power factor of 0.5.

**Efficiency:** CFL efficiency will be calculated by dividing luminous flux by power. Manufacturers must decide whether to qualify products under either Efficiency Option A or Efficiency Option B as defined in “ELI Voluntary Technical Specification for Compact Fluorescent Lamps.” It is only necessary to submit results for the reliability test if Option B is selected. It is only necessary to select Option B if the efficiency of the CFL is not high enough for it to qualify under Efficiency Option A. Test results submitted to ELI should indicate whether the application is for Option A or Option B.