



ENERGY STAR® Program Requirements

Product Specification for Lamps: Start Time

Draft Test Method Rev. Jan-2013

1 OVERVIEW

This document provides a description of the test method for determining start time of integrated compact fluorescent lamps (CFLs) and integrated LED lamps (“LED lamps”) (lamps) in an ambient air temperature environment.

2 APPLICABILITY

ENERGY STAR test requirements are dependent upon the product, category of the product under evaluation. The following guidelines shall be used to determine the applicability of each section of this document:

- **This start time test method applies to all CFL and solid state lighting (SSL) lamps included in the specification.**
- The test procedures in Section 7 shall be performed on products that are required to undergo the ENERGY STAR Start Time Test.

3 DEFINITIONS

Unless otherwise specified, all terms used in this document are consistent with the definitions in the ENERGY STAR Eligibility Criteria for Lamps.

Start Time: the time between the application of power to the device and the point where light output reaches 98% of the lamp’s initial plateau.

Comments were received from stakeholders that the definition could be simplified to 95% or 90% of initial plateau, that the initial plateau may not be readily identifiable, or that it may not be present for some technologies or circuits. Comments suggesting a change to a different measure, such as percentage of stabilized light output. While the definition of start time came out of research from a CFL working group, EPA is open to suggestions and requests supporting data for any alternate proposals.

4 METHODS OF MEASUREMENT AND REFERENCE DOCUMENTS

4.1 IES Test Methods and Reference Documents

- A) IES LM-66-11: 2011. IES Approved Method for Electrical and Photometric Measurements of Single-Ended Compact Fluorescent Lamps, Illuminating Engineering Society, New York.
- B) IES LM-79-08: 2008. IES Approved Method for Electrical and Photometric Measurements of Solid-State Lighting Products, Illuminating Engineering Society, New York.
- C) IES LM-54-12: 2012. IES Guide to Lamp Seasoning, Illuminating Engineering Society, New York.

5 TEST SETUP

5.1 General

- A) Test Setup and Instrumentation: The equipment required for the Start Time Test is as follows:
 - 1) Regulated AC or DC power supply (as applicable to the lamp)
 - 2) Multichannel oscilloscope with data storage capability
 - 3) Appropriate attenuator probe(s)
 - 4) Photodetector
- B) Lamp Seasoning and Preburning: Prior to the first readings, compact fluorescent lamps (CFL) shall be seasoned for 100 hours in accordance with IES LM-54-12. CFLs shall be preburned in accordance with IES LM-66-11. CFLs shall be seasoned and preburned in the position that the lamps will undergo lumen maintenance testing. LED lamps shall not be seasoned.
- C) Input Power for Start Time Measurements: The power requirements shall be per IES LM-66-11 or LM-79-08 as applicable. Note: When selecting a power supply for use with integrated lamps, it is necessary to apply an appropriate power factor when specifying the Volt-Amp rating of the power supply. Many integrated lamps have a power factor in the range of 0.5 to 0.6.
- D) Ambient Temperature: Lamps shall be stored at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ for a minimum of 24 hours prior to the test, and testing shall take place in an ambient temperature of $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$. Drafts shall be minimized.
- E) Power Meter: Power meters shall be capable of measuring to the appropriate requirements of IES LM-66-11 and/or IES LM-79-08 as applicable.
- F) Environmental Conditions: The test environment shall be clean and free from large amounts of dust and moisture.
- G) Orientation: Test samples in orientation(s) as specified by the ENERGY STAR specification or manufacturer specified position if different.

- H) Sample Selection: Samples shall be representative of the manufacturer's typical product. The samples shall be clean and thoroughly inspected before testing. Any flaws or inconsistencies in the lamp samples shall be noted.

Based on comments from stakeholders noting that a 10x probe as specified may be too restrictive, the test method equipment is adjusted to note that an appropriate probe be used. EPA requests stakeholder comments if allowing more laboratory flexibility could cause issue. Additionally, C78.5 referenced for seasoning for consistency with DOE requirements.

6 TEST CONDUCT

6.1 Guidance for Implementation Start Time Test Procedure

A) Photometric Measurements:

- 1) For integrating sphere measurements, refer to IES LM-66-11 or IES-LM-79-08 as applicable.
- 2) For non-integrating sphere measurements, the photodetector used for photometric measurements shall be a silicon detector corrected to closely fit the Commission Internationale de l'Eclairage (CIE) spectral luminous efficiency curve (V_{λ}).

B) Lamp Stabilization, Transfer and Re-stabilizations for CFLs:

- 1) CFLs shall be stored per requirements in the Environmental Conditions section before being transported to the start time testing equipment. Care shall be exercised to maintain lamp orientation and avoid shaking or bumping the lamp during the transfer. All lamps shall be re-stabilized prior to taking photometric measurements.

7 TEST PROCEDURES FOR ALL PRODUCTS

7.1 General Test Procedures

- A) Install the lamp in the test environment.
- B) Position the photocell so it sees the main body of the discharge tube or array (as applicable). Shield from extraneous light as required.
- C) When testing a covered compact fluorescent product, the photocell only needs to see the outer luminous face of the sample.
- D) Connect oscilloscope probe to measure the input voltage to the sample.
- E) Set the scope to trigger off the input voltage signal. Set trigger level at 10V.

- F) Set power supply to rated voltage and frequency of the device. If a range is specified, test sample at the midpoint of the range.
- G) Use an exemplar sample to determine the proper voltage and time base settings. Suggested initial time base is 200 mS/div.
- H) Apply rated voltage/frequency to the device.
- I) Record waveform on which the starting time was based.
- J) Record starting time. See Examples 1 and 2 below.

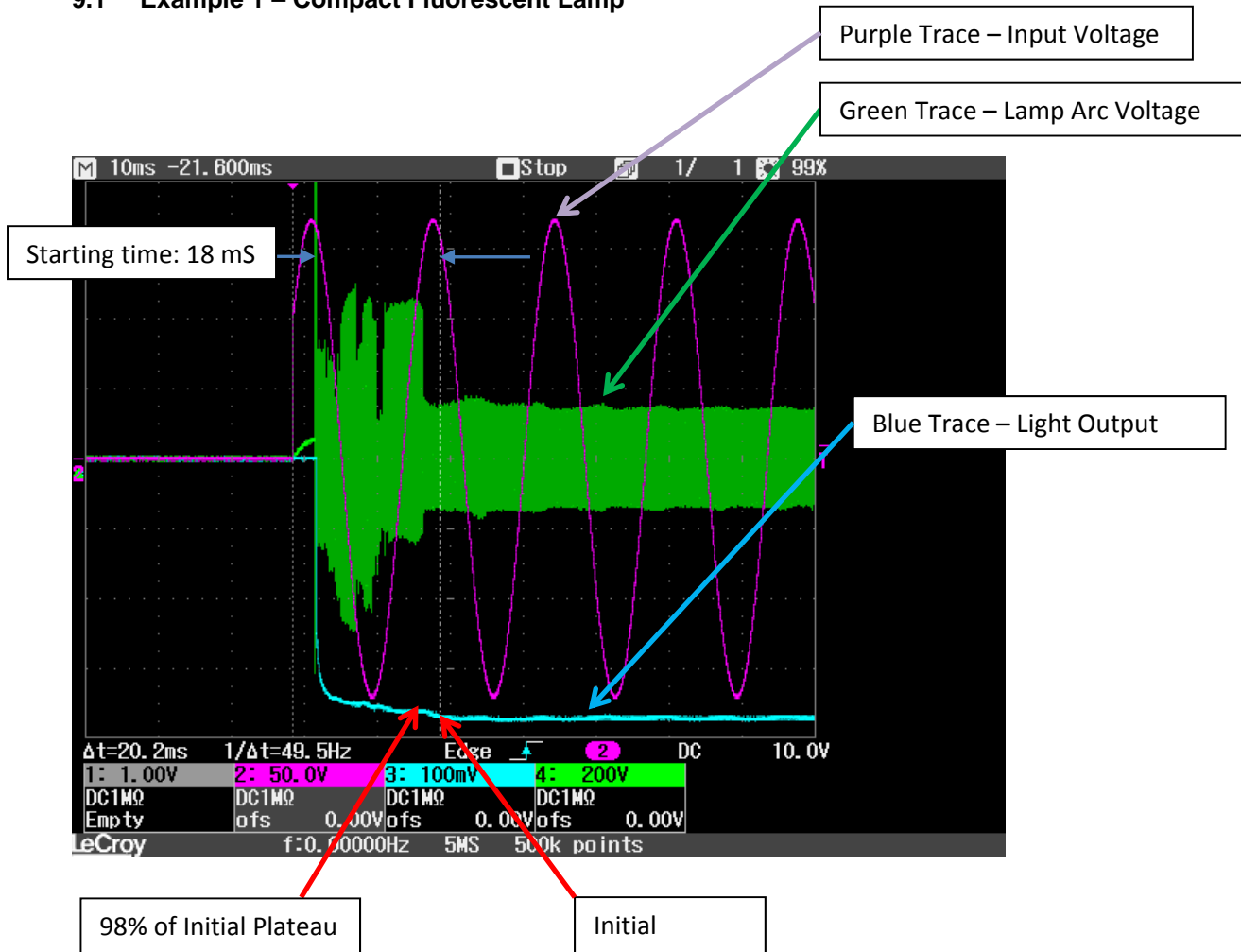
8 TEST REPORT FOR ALL PRODUCTS

Start Time Test (STT) report data shall include the following test information:

- A) Manufacturer's name and product identification
- B) Name and location of testing facility
- C) Test date
- D) Lamp base orientation
- E) Test voltage (V)
- F) Test frequency (Hz)
- G) Time base setting (mS/div)
- H) Waveform on which the starting time is based
- I) Starting time (mS)

9 EXAMPLES

9.1 Example 1 – Compact Fluorescent Lamp



9.2 Example 2 – LED Lamp

