



Designation: F2771 – 09

Standard Test Method for Determining the Luminance Curve of an Electroluminescent Lamp at Ambient Conditions¹

This standard is issued under the fixed designation F2771; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method establishes the procedures for determining the visible performance change, which is defined by luminance, color and cosmetic appearance of an electroluminescent lamp during operation over an extended time.

1.2 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*²

F1595 Practice for Viewing Conditions for Visual Inspection of Membrane Switches

F2359 Test Method for Determining Color of a Membrane Switch Backlit with Diffuse Light Source

F2360 Test Method for Determining Luminance of a Membrane Switch Backlit with Diffuse Light Source

3. Terminology

3.1 *Definitions:*

3.1.1 *luminance, n*—measure of the brightness or luminous intensity of light, usually expressed in units of candelas per square metre (cd/m^2) or foot lamberts. $1 \text{ fL} = 3.426 \text{ cd}/\text{m}^2$.

3.1.2 *luminance curve, n*—a graphical representation of the variation of luminance with time (implicitly under unvarying operating conditions).

3.1.3 *electroluminescent lamp (EL lamp), n*—essentially a capacitor structure with phosphor and a dielectric sandwiched between electrodes, one of which is transparent to allow light to escape. Application of an ac voltage across the electrodes generates a charging field within the phosphor, which causes it to emit light.

¹ This test method is under the jurisdiction of ASTM Committee F01 on Electronics and is the direct responsibility of Subcommittee F01.18 on Membrane Switches.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

3.1.4 *time to half luminance (THL), n*—the elapsed operating time over which the luminance of a lamp maintained under constant power conditions is reduced to 50 % of its initial value.

3.1.5 *membrane switch, n*—a momentary switching device, in which at least one contact is on, or made of, a flexible substrate.

4. Summary of Test Method

4.1 This test method includes an initial measurement of the luminance, color, and appearance of a lamp when powered with a specified voltage source. After initial characterization, the lamp is maintained under the same power conditions for an extended interval in a controlled environment designed to interfere minimally with the operating characteristics of the lamp. The luminance, color and appearance of the lamps under test are measured and recorded at a predetermined schedule throughout the test (initially the intervals are shorter to capture the rapid rate of change and longer as the test progresses). One output of the measurement is to identify the time of operation by which the measured luminance is reduced to half that recorded at the initial characterization.

5. Significance and Use

5.1 To provide a standardized test method that can be used for a valid comparison of luminance time curves, color changes and cosmetic changes between lamps of various designs, fabrication techniques, and sources.

6. Interferences

6.1 *Humidity*—Performance characteristics can be skewed with the change of humidity.

6.2 *Temperature*—Performance characteristics can be skewed with the change of temperature.

6.3 *Power*—Performance characteristics can be skewed with variations in the voltage, frequency and waveform of the power applied to the lamp.

7. Apparatus

7.1 Power source capable of providing an appropriate ac voltage and frequency. For example, operation at $110 \pm 3 \text{ VRMS}$, at $400 \pm 10 \text{ Hz}$, which is prevalent in the industry. Any deviation shall be reported.