

**ANSI C78.5-2003**  
Revision of C78.5-1997

# American National Standard

Approved: November 19, 2003

Secretariat: ANSLG -National Electrical Manufacturers Association

**For Electric Lamps**

**Specifications for  
Performance of Self-ballasted Compact Fluorescent Lamps**

## **American National Standard**

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**Foreword** (This foreword is not part of American National Standard C78.5-2003)

Suggestions for improvement of this standard should be submitted to the Secretariat C78, American National Standard Lighting Group (NEMA), 1300 North 17th Street, Suite 1847, Rosslyn, VA 22209.

This standard was processed and approved by Accredited Standards Committee on Electric Lamps, C78, and its Sub-Committee, C78 WG 02. Committee approval of the standard does not necessarily imply that all committee members voted for that approval.

Information concerning approval of this standard is based on the documents listed in the table below.

<b>Amendment / Change</b>	<b>CDV</b>	<b>RV</b>
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# Specifications for Performance of Self-ballasted Compact Fluorescent Lamps

## 1. Scope

This standard specifies the performance requirements together with the test methods and conditions required to show compliance of self-ballasted compact fluorescent lamps up to 60 watts which are intended for domestic and similar general lighting purposes. Globe and reflector types are excluded. Such lamps shall have a rated input voltage of 120 or 127 volts at 60 Hz and an Edison screw base.

## 2. Normative References

The following publications contain provisions which, through reference in this text, constitute provisions of this American National Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this American National Standard are encouraged to investigate the possibility of applying the most recent editions of the publications indicated below.

ANSI C78.375-1997, Fluorescent lamps - Guide for Electrical Measurements

CIE Publication 13.3-1995, Second edition, Method of measuring and specifying color rendering index of light sources

CIE Publication 15.2 (1986), Colorimetry

IESNA LM-65-2001, Approved method for Lifetesting of Compact Fluorescent Lamps

IESNA LM-66-2000, Approved method for the Electrical and Photometric Measurements of Single-ended Compact Fluorescent Lamps

UL 1993-1993, Standard for Self-Ballasted Lamps and Lamp Adapters

ANSI C82.13-2002, Definitions – for fluorescent lamps and ballasts

ANSI C82.77-2002, Harmonic emission limits – related power quality requirements for lighting equipment

### 3. Definitions

#### 3.1 General

See ANSI C82.13 for related definitions. Any standards referenced in those definitions should be considered as normative for the standard. Other definitions used in this standard follow.

#### 3.2 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.

#### 3.3 Starting temperatures

The minimum and maximum temperatures at which the lamp will reliably start.

### 4. Requirements

#### 4.1 General

Self-ballasted compact fluorescent lamps shall be so constructed that, in normal use, they are without danger to the user and the general surroundings.

Electrical and photometric performance of compact fluorescent lamps can be appreciably affected by drafts, ambient temperature, and burning position. For proper measurements of these characteristics, the requirements of clause 4, Ambient conditions, and clause 8, Lamp stabilization, in ANSI C78.375 must be met. Photometric procedures are covered under clauses 9,10, and 11 of IESNA LM-66. The lamps shall be stabilized base-up at 25°C.

#### 4.2 Marking

The unit shall be marked in accordance with clause 27 of UL1993, Standard for safety, Self-ballasted Lamps and Lamp Adaptors.

#### 4.3 Other markings

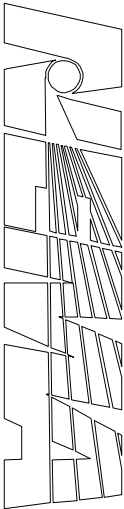
**4.3.1** The unit shall include instructions per clause 28 of UL1993 if so required.

**4.3.2** A warning regarding possible interaction with IR remote controls may be needed on the packaging of some units.

**4.3.3** If the luminous flux in other burning positions varies by more than 5% from the rated position it shall be marked on the packaging.

#### 4.4 Electro-magnetic interference

Units with electronic high frequency circuits shall comply with FCC regulations, Title 47 of the US Code of Federal Regulations, Part 18 for Consumer equipment. For units with electronic high frequency circuits operating below 1.705 MHz, radiated measurements shall be made from 30 to 200 MHz and be under the limits specified in FCC Part 18.305c.



#### **4.5 Color rendering index**

Self-ballasted compact fluorescent lamps shall have a minimum rated CRI of 80 when measured in accordance with CIE Publication 13.3. The CRI value of an individual unit shall not be less than the rated value decreased by three.

#### **4.6 Input power**

The input to the unit at rated supply voltage shall not exceed the rated value by more than 10% plus 0.5 watts.

#### **4.7 Starting time**

The time to start when tested at the rated supply voltage in a  $25 \pm 5^{\circ}$  C ambient shall not exceed 2 seconds for electronic high frequency units and 4 seconds for magnetic units. The time to start for these units when tested at 90% of the rated supply voltage and at the minimum specified starting temperature shall not exceed 5 and 10 seconds respectively. Guidance for the measurement of starting time is given in Annex A.

#### **4.8 Run-up time**

The run-up time shall not exceed 3 minutes when tested at rated supply voltage in an ambient of 25 C.

#### **4.9 Luminous Flux**

The initial luminous flux of the units tested shall average not less than 90% of the rated value.

#### **4.10 Lumen Maintenance**

The lumen maintenance at 40% of rated life shall not be less than 80%.

#### **4.11 Efficacy**

The minimum rated efficacy of a self-ballasted compact fluorescent lamp shall be at least 40 lpw.

#### **4.12 Lifetest**

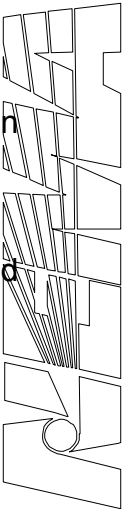
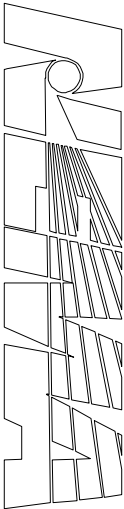
Lifetesting shall be done in accordance with the requirements on clauses 2, 3.2, 3.4, 5, and 6 of IESNA LM-65.

#### **4.13 Power Quality**

The requirements for this product as specified in C82.77 shall be met.

#### **4.14 Lamp current operating frequency**

To limit incompatibility with infrared remote controls, the lamp current operating frequency shall be greater than 40 kHz for units with electronic high frequency circuits. These frequencies shall be met under all stable normal operating conditions including dimming.



#### **4.15 Line transient requirements**

Electronic high-frequency ballasts are more susceptible to line transients than line frequency magnetic ballasts. Therefore, transient protection shall be included when lamps use electronic ballasts. The requirement for this transient protection is ANSI/IEEE C62.41, Class A1 minimum with the voltage increased to 2500V<sub>peak</sub>. The line transient test shall consist of seven strikes of a 100KHz Ring Wave, 2500V<sub>p</sub> level, for differential mode. The transient generator effective output impedance shall be 30 ohms maximum and the peak current shall be 83A minimum.

### **5. Selection of test specimens**

**5.1** Lamps shall be selected so as to ensure proper representation of the current design.

**5.2** At least 3 specimens shall be procured for each sample. It is prudent to select one or more additional specimens to serve as potential replacements in the event of breakage or if the specimens become defective during the test for reasons not connected to the test, or if one or more specimens exhibit abnormal behavior or fail to stabilize.

### **6. Tests**

#### **6.1 General**

**6.1.1** Each test shall be performed at least once with each of the three specimens. Each specimen shall meet the described test criteria.

**6.1.2** If a specimen breaks or becomes defective for reasons not as a result of the testing, the specimen shall be discarded. Similarly if a unit fails to stabilize or exhibits abnormal behavior, the lamp shall be discarded. Testing shall resume with a suitable replacement specimen procured and prepared in the same manner as the original specimen. The use of replacement specimens shall be documented in the test report.

#### **6.2 Power supply**

For other than lifetests, the voltage to the unit under test shall meet the requirements of clause 3, supply voltage characteristics in ANSI C78.375.

#### **6.3 Electrical instruments**

The electrical instruments used in the testing shall meet the requirements of clause 9, Instruments. in ANSI C78.375.

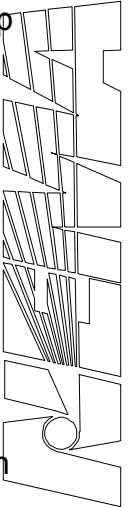
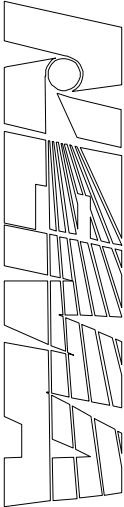
#### **6.4 Lifetest**

Tests to establish life ratings require a larger sample size. Guidance is given in IESNA LM-65 and the requirements cited above must be met.



**ANNEX A**  
**(Informative)**  
**Guidance for the measurement of lamp starting time**

1. Lamps shall be off and shall be stored at the specified ambient test temperature for at least 12 hours prior to the test.
2. No starting aid plane shall be used for the test.
3. The recommended method to detect lamp starting is to monitor lamp light output.
4. A photodetector must be located such that it will adequately respond to the lamp light output. Shielding from extraneous light may be required.
5. The laboratory should establish a responsive and repeatable set-up with their equipment and a documented test procedure prior to the test. This may include a qualification procedure for the operator.
6. Some lamps may contain a mercury amalgam that will delay the rise to full light output. This should not be interpreted as a delay in the starting time. The lamp should be considered as fully lighted if it is operating at essentially full current even if the light output is not uniform throughout the bulb.
7. A digital storage scope is recommended for monitoring the time from application of the test voltage and the output of the photo detector and the lamp input current.
8. Monitoring the lamp input current and/or wattage can also be an accurate method to test starting time but it may require more knowledge of lamps and judgement on the part of the operator. This alternate is acceptable if correlation to the recommended method is documented.



**Annex B**  
**(Informative)**  
**Bibliography**

IEC 60969-1988, Self-ballasted lamps for general lighting service, performance requirements

IEC 60968-1988, Self -ballasted lamps for general lighting service, safety requirements

CSA C861-1995, Performance of Compact Fluorescent Lamps and Ballast Adaptors

IESNA Lighting Handbook, ninth edition

