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ANSI C78.1450-1983
Revision of ANSI C78.1450-1982

American National Standard

for electric lamps – incandescent projection lamps – method for life testing

Approved July 1, 1983

Secretariat: National Electrical Manufacturers Association

1. Scope

1.1 This standard describes a method for life testing incandescent projection lamps. It also defines associated terms and describes a method of evaluating acceptability.

1.2 The life test method specified is primarily for use by lamp manufacturers but can be used by any qualified testing laboratory provided all the test requirements are met.

1.3 This standard is not intended to cover life testing of lamps in projection equipment, although it can be used as a guide for such testing. It shall be the responsibility of the projection equipment manufacturer to ensure that use conditions of the lamp meet respective lamp conditions as specified by the lamp manufacturer.

2. Definitions

2.1 **Lamp Life.** The accumulated time in hours that the filament will light. Failure of the filament to light for any cause other than mechanical shock is considered the end of life.

2.2 **Rated Life.** A declared value assigned by the lamp manufacturer.

2.3 **Average Life.** The statistical average life of a specific sampling of lamps as determined by means of a life test run in accordance with this standard.

2.4 **Early Failures.** Lamps that burn five minutes or less. Such lamps shall be excluded from the average life calculation.

2.5 **Acceptable Life.** Acceptable life is a computed value based on rated life and sample size.

3. Test Conditions

3.1 Lamp Test Fixture

3.1.1 The lamp test fixture shall have a suitable lampholder for the lamp being tested.

3.1.2 The fixture shall be physically stable and essentially free of all vibration.

3.1.3 The lamp shall be operated within the range of burning positions specified by the lamp manufacturer.

3.1.4 Fixtures for testing lamps designed to operate in conjunction with functional devices that affect filament life, such as reimaging back mirrors, shall incorporate those devices.

3.1.5 The fixture shall be equipped with a voltage regulator, cooling system, and cycle timer such that the conditions stated in 3.2, 3.3, and 3.4 are met.

3.1.6 A photocell, current-sensing device, or other means shall be used to operate an accumulated time

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device for recording the time that a lamp is burning.

3.2 Voltage

3.2.1 Unless otherwise specified, lamps shall be operated at rated alternating current voltage ± 0.5%. Voltage shall be measured with a true rms voltmeter as close to the lamp base terminals as is practical.

3.2.2 Lamps which are designed for special power requirements, such as soft turn-on, direct current, and nonsinusoidal alternating current shall be tested at the voltage conditions specified for those lamps.

3.3 Lamp Cooling. During normal use, natural heating up and cooling down may have an effect on the life of an individual lamp. Therefore, to simulate normal use, lamp cooling during the ON-OFF duty cycle specified in 3.4 shall be such that:

(1) The lamp base and seal temperatures during the ON time of the duty cycle do not exceed the maximum temperatures specified by the lamp manufacturer

(2) The bulb temperature during the ON time of the duty cycle does not exceed the maximum temperature or fall below the minimum temperature specified by the lamp manufacturer

(3) All components of the lamp cool down to or near room temperature during the OFF time of the duty cycle.

3.4 Test Cycle

3.4.1 Lamps having a rated life of 200 hours or less shall be tested with a 60-minute or less ON-OFF duty cycle, with 30 minutes as the maximum ON time.

3.4.2 Lamps having a rated life of more than 200 hours shall be tested with a 24-hour or less (but greater than 60 minutes) ON-OFF duty cycle, with 12 hours as the maximum ON time.

3.4.3 The following are examples of ON-OFF duty cycles:

Rated Life of Lamp (Hours)	*Examples of Duty Cycles*
(1) 200 or less	(a) 15 minutes ON–5 minutes OFF
	(b) 15 minutes ON–15 minutes OFF
	(c) 30 minutes ON–30 minutes OFF
(2) More than 200	(a) 11 hours ON–1 hour OFF
	(b) 12 hours ON–12 hours OFF

3.4.4 Lamps designed for special burning cycles, such as continuous burning or very short (flashing) cycles, shall be tested accordingly. The special burning cycle shall be reported in the test documentation.

4. Test Procedure

4.1 A sample of lamps shall be cycled in lamp fixtures under the conditions stated in Section 3 until the end of life as defined in 2.1.

4.2 The average life of a given sample of lamps shall be calculated as follows:

$\overline{X} = A/B$

where:

$\overline{X}$ = average life of a given sample of lamps, in hours

A = total accumulated hours of ON time for all the lamps in the sample

B = number of lamps in the sample

5. Acceptability

5.1 The lower limit of acceptable life of a given sample of lamps shall be calculated as follows:

$Y = CD$

where:

Y = lower limit of acceptable life of a given sample of lamps, in hours

C = rated life of lamps in the sample, in hours

D = lowest percentage of rated life, from Table 1

5.2 In order to be acceptable, the average life of a given sample of lamps shall be not less than the lower limit of acceptable life as calculated in accordance with 5.1.

EXAMPLE: A sample consisting of six lamps, each having a rated life of 50 hours, is tested, and the total number of hours of ON time for the six lamps is 222 hours. The average life of this sample = 222/6 = 37 hours.

The lower limit of acceptable life will be 50 × 69% = 34.5 hours.

This sample is acceptable because the average life (37 hours) is not less than the lower limit of acceptable life (34.5 hours).

Table 1
Sample Size versus Percentage of Rated Life

Number of Lamps in Sample	Lowest Percentage of Rated Life
250 and over	95
249-100	92
99-55	90
54-45	89
44-35	87
34-30	86
29-25	85
24-20	83
19-18	82
17-16	81
15-14	80
13-12	78
11	77
10	76
9	75
8	73
7	72
6	69
5	66

NOTE: Table 1 is taken from Federal Specification W-L-126a Amendment-1, dated August 17, 1961, TABLE III – Life Tolerance.

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