

JOINT APPENDIX 8

TESTING OF LUMINAIRES AND LIGHTING SYSTEMS

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8.1 Testing of Light Emitting Diode Lighting Systems

8.1.1 Scope

The testing methods in this appendix shall be used to determine wattage and efficacy for all light emitting diode (LED) lighting systems, also known as solid state lighting (SSL).

The power of luminaires and integral trims containing only LED lighting systems shall be determined in accordance with JA 8.1.2. For luminaires containing LED lighting systems in addition to one or more other lighting technologies, the power of the LED lighting system shall be determined in accordance with JA 8.1.2, and the power of non-LED lighting components shall be determined in accordance with Title 24, Part 6, Section 130(d)(1, 2, 3, 4, or 6) as appropriate.

The efficacy of luminaires and integral trims containing only LED lighting systems shall be determined in accordance with JA 8.1.3. For luminaires containing LED lighting systems in addition to one or more other lighting technologies, the efficacy of the LED lighting system shall be determined in accordance with JA 8.1.3, and the efficacy of non-LED lighting components shall be determined in accordance with Title 24, Part 6, Section 150(k)(1 and 2).

8.1.2 Determining the Wattage of Light Emitting Diode (LED) lighting Systems

The wattage of LED lighting system shall be determined as follows, or by a method approved by the Executive Director:

- The wattage shall be the maximum rated input wattage of the LED lighting system, including power used by fans, transformers and power supply devices, and
- The wattage shall be listed on a permanent, pre-printed, factory-installed label on the luminaire housing, or on the integral LED trim when applicable, and
- The LED lighting system shall be tested in a Underwriters Laboratory (UL) 1598 testing apparatus in a National Voluntary Laboratory Accreditation Program (NVLAP) or International Standards Organization (ISO) 17025 accredited lab as specified by UL; and
- The LED lighting system shall be tested according to all of the following conditions:
 1. The ambient temperature in which measurements are being taken shall be maintained at 25°C ± 1°C.
 2. The AC power supply shall have a frequency of 60 Hz, and a sinusoidal voltage wave shape.
 3. The voltage of an AC or DC power supply shall be regulated to within ±0.2 percent.
 4. The LED lighting system under test shall be burned-in for 100 hours before testing.
 5. The LED lighting system under test shall be operated and stabilized before testing at ambient temperature and burning position as specified until the LED product reaches thermal equilibrium. Stability is reached when the variation of light output remains within 1% for a period of 10 minutes at constant ambient temperature and constant electrical input.

6. The LED lighting system under test shall be measured at the burning position in which it will be installed in the luminaire.
7. The LED lighting system under test shall be operated at the rated voltage (AC or DC) according to the specification of the LED lighting system for its normal use.
8. Pulsed operation of the LED lighting system shall not be acceptable

8.1.3 Determining the Efficacy of Light Emitting Diode (LED) Lighting Systems

The efficacy of LED lighting systems shall be determined as follows, or by a method approved by the Executive Director:

- Luminous flux shall be measured after the system has stabilized in accordance with JA 8.1.2(d)5; and
- The total luminous flux of the LED lighting system under test shall be measured with an integrating sphere photometer or a goniophotometer by a lab accredited by Underwriters Laboratory (UL) under their client test data program; and
- The total luminous flux of the LED lighting system shall be permanently pre-printed on the LED circuit board, or on the integral LED trim when applicable; and
- The luminous efficacy (lumens per watt) of the LED lighting system shall be the quotient of measured total luminous flux (lumens) and the measured electrical input power (watts) of the LED lighting system under test when tested in accordance with JA 8.1.2a; and
- The LED lighting system under test shall be equal to the LED lighting system in the installed luminaire.