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Recommended Basic Conditions for Measuring the
Photometric Output of Stage and Studio Luminaires by
Measuring Illumination Levels Produced on a Planar
Surface

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Interest category codes:

CP = custom-market producer DE = designer MP = mass-market producer
DR = dealer rental company G = general interest U = user

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1 Scope

This document describes the basic conditions for measuring the photometric output of a stage or studio luminaire by testing methods that measure the illumination levels produced by the luminaire on a planar surface. These testing methods include, but are not limited to, measurements taken by digital cameras or hand-held meters. This standard is not intended to give guidance on testing conditions for testing methods that use goniophotometers.

2 Selection Of Luminaires, Lamps, Ballasts, And Drivers

2.1 The luminaire selected for testing shall be representative of the manufacturer's product being tested.

2.2 The lamp used for the testing shall be representative of the lamps that are intended to be used in the luminaire.

2.3 With luminaires that use discharge lamps, the ballasts used shall be representative of the ballasts recommended by the luminaire manufacturer for the luminaires.

2.4 With luminaires that use LED sources, the drivers used shall be representative of the drivers recommended by the luminaire manufacturer for the luminaires.

3 Basic Conditions

Precautions shall be taken to eliminate stray light from the test so that the stray light is less than the margin of error of the testing equipment.

The temperature of the test area shall be maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ ($77^{\circ}\text{F} \pm 2^{\circ}\text{F}$) for fluorescent lamps and LED sources, and at $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ($77^{\circ}\text{F} \pm 9^{\circ}\text{F}$) for all other types of lamps.

4 Test Lamp Calibration

This standard does not require test lamp calibration in all cases, but test lamp calibration may be appropriate depending on the intended use of the data being collected by the measurements. Some consideration of the variability of lamp output must be used if the measurements from the testing are to be extrapolated to a population of luminaires.

4.1 If a statistically small number of luminaires are to be tested, and some statement about the performance an end-user can expect from any luminaire out of the population of luminaires of the same type is intended to be made, the test lamp's output shall be calibrated using the calibration method used by the lamp manufacturer. This will allow normalizing the measured data relative to the rated lumen output of the lamp.

4.2 If some statement about the performance an end-user can expect from any luminaire out of the population of luminaires of the same type is intended to be made, but a statistically significant number of luminaires are to be tested, lamp calibration is not required. In lieu of lamp calibration, the output of the luminaires in a significantly large sampling may be measured. This will allow the mean to be reported, along with the standard deviation and sample size, or along with the confidence interval of the true population mean. Lamp calibration, as described in 4.1, may be used.

4.3 If the intention is to make a statement about the efficiency of the optical system, the lamp must be calibrated while operated in the conditions found in the luminaire. These conditions would include the temperatures, operating position, current, and voltage found in the luminaire.

Caution: *Measuring voltage and current under luminaire operating conditions may involve exposure to hazardous voltages. All measurements shall be made by qualified personnel who are able to recognize the dangers and to take appropriate remedial action.*

5 Lamp Operation During Luminaire Testing

5.1 Luminaire tests with incandescent lamps are to be performed with the lamp operated within 1% of the luminaire manufacturer's rated voltage. The lamp shall be operated at the rated voltage in the luminaire for at least 15 minutes before the testing begins.

5.2 Luminaire tests with discharge lamps are to be performed with the ballast specified by the luminaire manufacturer operated on a supply within 1% of the input voltage specified by the luminaire manufacturer. The discharge lamp shall be operated in the luminaire until the light output is stable.

5.3 Luminaire tests with LED sources are to be performed with the driver specified by the luminaire manufacturer operated on a supply within 1% of the input voltage specified by the luminaire manufacturer. The LED source or sources shall be operated in the luminaire until the light output is stable.

6 Test Measurement Equipment

All measurement equipment used in luminaire testing shall be calibrated and used in accordance with the equipment manufacturer's instructions and recommendations.