

JJG

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Verification Regulation of Illuminance Meter

光照度计

(English Translation)

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1 Scope

This Regulation applies to the initial verification, subsequent verification, in-use inspection of illuminance meters (hereinafter referred to as illuminance meters). The requirements related to measurement performance in type identification and prototype testing can be implemented with reference to Regulation.

2 Normative references

This Regulation cites the following documents:

"Illuminance Meter" OIML 1988 English version

"Performance Test Methods for Photometers and Luminometers" CIE 1987 English version

JJF 1059-1999 "Evaluation and Expression of Uncertainty in Measurement"

When using this Regulation, attention shall be paid to using the currently valid versions of the above cited documents.

3 Overview

An illuminance meter is a measuring instrument for measuring illuminance. It consists of a photometric probe (including a cosine corrector, a $V(\lambda)$ correction filter, a photoelectric receiver) and a display (digital or pointer type). When the photoelectric receiver receives the optical radiation passing through the cosine corrector and $V(\lambda)$ filter, the generated photoelectric signal is processed and the corresponding illumination value is displayed on the display.

4.1 Relative indication error

The relative indication error of the illuminance meter shall not exceed the requirements of Table 1.

I - The distance from the filament plane of the standard lamp to the test surface of the photometric probe, m.

During verification, the distance -- between the filament plane of the standard lamp and the photometric probe must be at least 15 times greater than the maximum linear dimension of the light-emitting surface or the test surface of the photometric probe (the diagonal length or diameter of the filament plane and the test surface of the photometric probe).

The standard illuminance meter shall calibrate at least five equally spaced points, within the full range of each gear. The level 1 and level 2 illuminance meters shall calibrate at least three equally spaced points. Each point shall be illuminated for 5 seconds and its display value shall be read. Each instrument is required to be verified for two rounds.

The relative deviation of the two rounds of values: standard, level 1, level 2 illuminance meters shall not exceed 0.6%, 1%, 1.5%, respectively. The average value of each point is taken as the final result. The relative indication errors of illuminance meters at all levels shall comply with the requirements of 4.1.

Relative indication error = $[(\text{Displayed value} - \text{standard value}) / \text{Standard value}] \times 100\%$ (2)

For level 1 and level 2 illuminance meters, the comparison method can also be used for verification. See Appendix B for the method.

6.3.3 Cosine characteristic (directional response) error of illuminance meter

6.3.3.1

Install the photometric probe on the rotating platform with the dial of the photometric measuring device, so that the rotation axis of the platform passes through the center line of the test surface. Adjust the filament plane of the standard lamp and the test surface of the photometric probe, so that they are perpendicular to the horizontal measurement axis of the light track, with the center point located on this axis. Arrange a number of diaphragms between the standard lamp and the photometric probe. The distance from the standard lamp to the photometric probe shall be at least 15 times the maximum linearity of the luminous surface of the standard lamp or the test surface of the photometric probe.

Figure 1 -- Schematic diagram of calibrating the illuminance meter on the photometric measuring device

Calculate the total directional error f_2 of the optical probe according to formula (4):

Where:

1.484 rad is equal to 85° .

The directional response error of illuminance meters at all levels shall comply with the requirements of 4.3.

The derivation relationship between formula (3) and formula (4) can be found in Appendix D.

6.3.4.1 On the photometric measuring device, install the standard lamp and the

photometric probe of the illuminance meter in accordance with the requirements for calibrating the illuminance meter. The position of the fixed photometric probe remains unchanged; the standard lamp is moved so that the display value Y of the illuminance meter reaches 1/10 of the full scale; its corresponding standard illuminance value is X .

Then move the standard lamp to make the display value of the illuminance meter reach $Y_{\max}$ (close to full scale). Find the corresponding standard illuminance value $X_{\max}$.

6.3.4.2 Calculate the nonlinear error f_3 of the photometer according to formula (5):

Where:

X - Standard illumination value;

Y - Display value when the standard illumination value X illuminates the photometer probe;

X max - The standard illumination value corresponding to the maximum display value

Y max ;

Y max - Maximum display value.

The nonlinear errors of illuminance meters at all levels shall comply with the requirements of 4.4.

6.3.5.1 On the photometric measuring device, install the standard lamp and the

photometric probe of the illuminance meter in accordance with the requirements for calibrating the illuminance meter. Keep the position of the fixed photometric probe unchanged; move the standard lamp, so that the standard illumination value X (A) reaches 90% of the full scale in the low-range gear A; its displayed value is Y (A). Then change the illuminance meter to the relatively high range B; move the standard lamp so that the standard illuminance value X (B) increases k times compared to X (A). Read the illuminance meter's display value Y (B).

6.3.5.2 Calculate the error f_4 caused by the change of measuring range according to formula (6):

Where:

Y(A) - The display value of the standard illumination value X (A) (equivalent to 90% of the full scale) in the range A gear;

Y(B) - The display value of X (B) that is k times higher than X (A) in the relatively high range B gear;

k - Shift multiple, $k = Y(\text{full-scale reading of range B gear}) / Y(\text{full-scale reading of range A gear})$.

The shifting error of illuminance meters at all levels shall comply with the requirements of 4.5.

6.4 Processing of verification results

Carry out verification one by one according to the provisions of 6.2 "Verification items".

Record the various data obtained. Calculate the results. If all items meet the requirements of this Regulation, it will be judged as qualified (for ungraded illuminance meters, a verification conclusion can be issued that "the verified items meet the requirements of a certain level of illuminance meter"); otherwise, it will be unqualified.

For qualified instruments, a calibration certificate will be issued; for unqualified instruments, a calibration result notification will be issued. Please refer to Appendix E for the format of the inner pages.