

Specification for Luminance meters

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Committees responsible for this British Standard

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- British Lighting Association for the Preparation of Standards (BRITLAPS)
- Chartered Institution of Building Services Engineers
- GAMBICA (BEAMA Ltd.)
- Institution of Civil Engineers
- Institution of Electrical Engineers
- Lighting Industry Federation Ltd.
- National Physical Laboratory

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Foreword

This British Standard has been prepared by Subcommittee CPL/34/5.

Luminance meters are used for measurements relating to many varied applications, such as:

- road lighting;
- road tunnel entrances;
- “patch testing” of luminaires for use near visual display units;
- cathode ray tubes and other display screens;
- light boxes for examining X-ray and other transparencies;
- road and advertising signs;
- signal lamps such as traffic lights.

In many of these applications luminance levels are specified.

The approach of this standard is similar to that used for BS 667:1996 on illuminance meters. This new British standard specifies the requirements for two types of luminance meter: Type L: laboratory instruments and Type F: field instruments. The error tolerances have been considered in a similar manner to that used in CIE Publication 69 [1], and the definitions are based on CIE Publication 17.4 [2].

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 10, an inside back cover and a back cover.

Introduction

This British Standard specifies the requirements for meters for the measurement of photopic luminance. It is often inappropriate to measure photopic luminance at levels below $2 \text{ cd}\cdot\text{m}^{-2}$. At these relatively low luminances the colour sensitivity of the human eye changes and research work is still in progress on this subject.

Photometric measurements, even under laboratory conditions, are more difficult to determine precisely than many other kinds of physical measurement, and in the case of luminance meters, liability to error is increased by the fact that many of the essential components of such instruments are susceptible to variation with time and use. These errors can be minimized by care in the design of the instrument as a whole, and also by the user in not exposing it to deleterious conditions of temperature, illumination or atmosphere.

1 Scope

This British Standard specifies the performance requirements for two types of luminance meter, Type L (laboratory instruments) and Type F (field instruments). This standard is intended for use by meter manufacturers and users.

2 Normative references

The following normative documents contain provisions which, through reference in this text constitute provisions of this British Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the publication referred to applies.

PD 6461-3:1995, *Vocabulary of metrology Part 3: Guide to the expression of uncertainty in measurement*.

CIE Publication 53:1982, *Methods of characterizing the performance of radiometers and photometers*.

3 Definitions

For the purposes of this British Standard the following definitions apply.

3.1

luminance (in a given direction, at a given point of a real or imaginary surface) (L_v ; L)

quantity defined by the formula:

$$L_v = \frac{d\Phi_v}{dA \cdot \cos\theta \cdot d\Omega}$$

where

$d\Phi_v$ is the luminous flux transmitted by an elementary beam passing through the given point and propagating in the solid angle $d\Omega$ containing the given direction;

dA is the area of a section of that beam containing the given point;

θ is the angle between the normal to that section and the direction of the beam

unit: $\text{cd}\cdot\text{m}^{-2} = \text{lm}\cdot\text{m}^{-2}\cdot\text{sr}^{-1}$

[CIE 17.4:1987, definition 845-01-35]

3.2

luminance meter

instrument for measuring luminance

3.3

photoelectric detector

detector of optical radiation in which the absorption of photons results in the generation of an electric current or voltage, or causes a change in electrical resistance

NOTE 1 Referred to in the text as a “detector”.

NOTE 2 The term “photoelectric cell” is also in use.

3.4

selective or coloured filter

medium which changes the spectral distribution of radiation by transmission

3.5

colour temperature

temperature of the full radiator which emits radiation of the same (or nearly the same) chromaticity as the radiation considered

3.6

photometer head

photoelectric detector the spectral response of which is weighted (usually by means of coloured filters) to approximate the CIE spectral luminous efficiency function $V(\lambda)$ of the human eye for photopic vision; with either a variable-focus optical system or a fixed focus system in front of the detector

NOTE More information on the spectral response is given in C.2.

3.7

measurement field

projected area of the object being measured, from which light is received by the detector

NOTE 1 The measurement field is generally circular. It can, however, have other shapes (e.g. trapezoidal, square or irregular).

NOTE 2 For circular fields, the measurement field is determined by the measurement field angle (see 3.8). Differently shaped measurement fields can have the measurement field angle expressed in various ways.