

# INTERNATIONAL STANDARD

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## Colorimetry —

### Part 1: CIE standard colorimetric observers

*Colorimétrie —*

*Partie 1: Observateurs CIE de référence pour la colorimétrie*

Preview

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

ISO 11664-1 was prepared as Standard CIE S 014-1/E by the International Commission on Illumination, which has been recognized by the ISO Council as an international standardizing body. It was adopted by ISO under a special procedure which requires approval by at least 75 % of the member bodies casting a vote, and is published as a joint ISO/CIE edition.

The International Commission on Illumination (abbreviated as CIE from its French title) is an organization devoted to international cooperation and exchange of information among its member countries on all matters relating to the science and art of lighting.

ISO 11664-1 was prepared by CIE Division 2 *Physical measurement of light and radiation*.

ISO 11664-1 was initially published by ISO as ISO 10527:2007, and has subsequently been renumbered to be part 1 of the ISO 11664 series.

ISO 11664 consists of the following parts, under the general title *Colorimetry*:

- *Part 1: CIE standard colorimetric observers* [published previously as ISO 10527:2007, which has been cancelled]
- *Part 2: CIE standard illuminants* [published previously as ISO 10526:2007, which has been cancelled]
- *Part 4: CIE 1976 L\*a\*b\* Colour space*

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Standard

COMMISSION INTERNATIONALE DE L'ÉCLAIRAGE  
INTERNATIONAL COMMISSION ON ILLUMINATION  
INTERNATIONALE BELEUCHTUNGSKOMMISSION

# Colorimetry - Part 1: CIE Standard Colorimetric Observers

Colorimétrie - Partie 1: Observateurs de référence colorimétriques CIE

Farbmessung - Teil 1: CIE farbmetrische Normalbeobachter

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## FOREWORD

Standards produced by the Commission Internationale de l'Eclairage (CIE) are a concise documentation of data defining aspects of light and lighting, for which international harmony requires such unique definition. CIE Standards are therefore a primary source of internationally accepted and agreed data, which can be taken, essentially unaltered, into universal standard systems.

This CIE Standard replaces ISO/CIE 10527:1991 and was approved by the CIE Board of Administration and the National Committees of the CIE. This CIE Standard has been prepared by CIE Division 2 "Physical measurement of light and radiation".

This standard contains only minor changes from the previous standard, in particular the values in the tables of the colour matching functions and chromaticity coordinates of the CIE 1931 and 1964 standard colorimetric observers are identical with the previous standard, but it has now been clarified that they apply for standard air.

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## COLORIMETRY - PART 1: CIE STANDARD COLORIMETRIC OBSERVERS

### INTRODUCTION

Colours with different spectral compositions can look alike. An important function of colorimetry is to determine whether a pair of such metameric colours will look alike. The use of visual colorimeters for this purpose is handicapped by variations in the colour matches made amongst observers classified as having normal colour vision. Visual colorimetry also tends to be time-consuming. For these reasons, it has long been the practice in colorimetry to make use of sets of colour-matching functions to calculate tristimulus values for colours: equality of tristimulus values for a pair of colours indicates that the colour appearances of the two colours match, when they are viewed in the same conditions by an observer for whom the colour-matching functions apply. The use of standard sets of colour-matching functions makes the comparison of tristimulus values obtained at different times and locations possible.

### 1. SCOPE

This International Standard specifies colour-matching functions for use in colorimetry. Two sets of colour-matching functions are specified.

#### a) Colour-matching functions for the CIE 1931 standard colorimetric observer

This set of colour-matching functions is representative of the colour-matching properties of observers with normal colour vision for visual field sizes of angular subtense from about 1° to about 4°, for vision at photopic levels of adaptation.

#### b) Colour-matching functions for the CIE 1964 standard colorimetric observer

This set of colour-matching functions is representative of the colour-matching properties of observers with normal colour vision for visual field sizes of angular subtense greater than about 4°, for vision at sufficiently high photopic levels and with spectral power distributions such that no participation of the rod receptors of the retina is to be expected.

### 2. NORMATIVE REFERENCES

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

CIE 15:2004. *Colorimetry*, 3<sup>rd</sup> edition.

CIE 17.4-1987. *International lighting vocabulary (ILV)* - Joint publication IEC/CIE.

### 3. DEFINITIONS

For the purposes of this International Standard, the following definitions apply. These definitions are taken from CIE 17.4-1987, where other relevant terms will also be found.

#### 3.1 colour stimulus function, $\varphi_{\lambda}(\lambda)$ (see ILV 845-03-03)

description of a colour stimulus by the spectral concentration of a radiometric quantity (such as radiance or radiant power) as a function of wavelength

#### 3.2 relative colour stimulus function, $\varphi(\lambda)$ (see ILV 845-03-04)

relative spectral power distribution of the colour stimulus function

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