

ICS 17.180.20
CCS K70



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 20147.3-2023

Colorimetry - Part 3: CIE tristimulus values

色度学 第3部分：CIE三刺激值

Issued on: August 6, 2023

Implemented on: March 1, 2024

**Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC**

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part

1. Structure and Drafting Rules of Standardization Documents" Drafting. This document is Part 3 of GB/T 20147 "Colorimetry". GB/T 20147 has published the following parts.

---Part 3: CIE tristimulus value;

---Part 4: CIE1976L*a*b* color space. This document is modified to adopt ISO /CIE11664-3:2019 "Colorimetry Part 3: CIE Tristimulus Values". The technical differences between this document and ISO /CIE11664-3:2019 and their reasons are as follows:

---Added the description of the scope of application (see Chapter 1);

---Replaced CIE S017 with normatively quoted GB/T 2900.65 to adapt to my country's technical conditions and increase operability (see Chapter 3);

6.2 is changed to the main text to comply with the writing rules of our country's standards (see 6.2);

7.2 is changed to the main text to comply with the writing rules of our country's standards (see 7.2). The following editorial changes have been made to this document.

---Change the title of Chapter 4 "Symbols and Abbreviations" to "Symbols". Please note that some content in this document may be subject to patents. The publisher of this document assumes no responsibility for identifying patents. This document is proposed by China Light Industry Federation. This document is under the jurisdiction of the National Lighting Appliances Standardization Technical Committee (SAC/TC224). This document was drafted by: Zhejiang University, Shenzhen Baoan District New Display Industry

Technology Promotion Center, Guangzhou Mingdao Culture Technology Group Co., Ltd., Foshan Electrical and Lighting Co., Ltd., Zhongshan Songwei Lighting and Electrical Co., Ltd., Binzhou University, Fudan University, Shenzhen Municipal Yangguang Electronics Co., Ltd., Beijing Electric Light Source Research Institute Co., Ltd., Fujian Institute of Engineering, Wuhan University, China Metrology Research Institute, China Illuminating Society, Communications and Signal Research Institute of China Academy of Railway Sciences Group Co., Ltd., and Wuxi Institute. The main drafters of this document. Ye Wei, Zeng Xiaolan, Chen Hao, Yu Shaotao, Xie Wei, Xu Haisong, Zhang Fuzheng, Lin Yandan, Qin Shengyan, Zhang Bo, Du Feng, Liu Qiang, Zhao Weiqiang, Bi Xiaoman, Li Toyota, Huang Sungang.

Color stimuli with different spectral distributions may appear the same. An important function of colorimetry is to use a given set of colors. The color matching function determines which stimuli look similar to a given observer. This is achieved by calculating tristimulus values for each stimulus. Equality of the three stimulus values indicates equal color appearance under the same illumination and observation conditions. This document is based on CIE's long-term analysis of tristimulus values. Definitely recommended. According to the characteristics of different workplaces, GB/T 20147 is planned to be divided into the following six parts.

---Part 1: CIE standard colorimetric observer. The purpose is to specify two sets of color matching functions in colorimetry.

---Part 2: CIE standard lighting body. The purpose is to specify two standard illuminants in colorimetry.

---Part 3: CIE tristimulus value. The purpose is to specify a method for calculating the tristimulus value of a color stimulus of known spectral distribution.

---Part 4: CIE1976L*a*b* color space. The purpose is to specify the calculation of CIE1976L*a*b* color space coordinates method and two methods for calculating Euclidean color difference in this space.

1 Scope

GB/T 20147.3-2023 is Part 3 of the Chinese colorimetry series and covers the calculation of CIE tristimulus values. Every colour measurement anywhere ends in three numbers computed by integrating a spectrum against the colour matching functions, and the answer depends on details that are easy to get wrong and hard to notice: the wavelength interval used, how the ends of the range are handled, and how missing or unevenly spaced data is interpolated. Two instruments measuring the same sample can differ for no reason but this. The standard sets the standard method of calculation and the simplified method, the supplementary handling of the input data, the chromaticity coordinates, the numerical procedures and the reporting of results. It took effect on 1 March 2024.

This document specifies methods for calculating tristimulus values for color stimuli of known spectral distribution that can be produced by self-illuminating light sources or Produced by reflective or transmissive objects. This document specifies the color stimulus function at least within the wavelength range of 380nm~780nm with a measurement interval not exceeding 5nm. Tabulate. For wavelength measurement ranges less than 380nm~780nm, it is recommended to use the extrapolation method. This document gives a standard method for summation at intervals of 1 nm in the wavelength range from 360nm to 830nm. to bigger Wavelength spacing (up to 5nm) and shorter wavelength ranges (as short as 380nm~780nm) define alternative simplified methods. only at Use alternative methods only where appropriate and after the user has reviewed the impact on the final result. This document applies to colorimetric calculations, colorimetric measurement instrument design, manufacturing and colorimetric measurement related application fields. This document can be used in conjunction with the CIE1931 standard colorimeter observer or the CIE1964 standard colorimeter observer.

2 Normative reference documents

The contents of the following documents constitute essential provisions of this document through normative references in the text. Among them, the dated quotations For undated referenced documents, only the version corresponding to that date applies to this document; for undated referenced documents, the latest version (including all amendments) applies to this document.

GB/T 2900.65 Electrical terminology lighting [GB/T 2900.65-2004,
IEC 60050(845).1987, MOD] ISO /CIE11664-

1 Colorimetry Part 1: CIE standard colorimetry observer (Colorimetry-Part 1: CIEstandard

3 Terms and definitions

The terms and definitions defined in GB/T 2900.65 apply to this document.

4 Symbols

The following symbols apply to this document. k, k_{10} normalization constant K_m Maximum spectral photovisual efficacy of radiation in CIE standard physical photometry system Maximum spectral optical performance of radiation when $K_m, 10 V_{10}(\lambda)$ function is used in photometry $R(\lambda)$ spectral reflection factor $S(\lambda)$ Relative spectral distribution of illuminant $V(\lambda)$ Spectral optical efficiency function in CIE standard physical photometry system $V_{10}(\lambda)$ $y_{10}(\lambda)$ function is the spectral optical efficiency function when used in photometry $W_x(\lambda), W_y(\lambda), W_z(\lambda)$ precomputed weights for tristimulus value integration using CIE1931 standard colorimetric observers function $W_{x,10}(\lambda), W_{y,10}(\lambda), W_{z,10}(\lambda)$ Precomputed weights for

tristimulus value integration by CIE1964 standard colorimetric observer

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