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GB/T 45239-2025

Evaluation methods of nocturnal blue light radiation hazards

夜间蓝光辐射危害的评价方法

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part

1.Structure and drafting rules for standardization documents" Drafting. Please note that some of the contents of this document may involve patents. The issuing organization of this document does not assume the responsibility for identifying patents. This document was proposed by the China Machinery Industry Federation. This document is under the jurisdiction of the National Technical Committee on Optical Radiation Safety and Laser Equipment Standardization (SAC/TC284). This document was drafted by: Zhejiang Sanse Optoelectronics Technology Co., Ltd., Kent Intelligent Technology (Shenzhen) Co., Ltd., Changzhou Inspection and Testing Co., Ltd. Standard Certification Institute, Zhejiang Smart Lighting Technology Co., Ltd., Foshan Electrical Lighting Co., Ltd., Zhongshan Songwei Lighting Electrical Co., Ltd. Company, Hangzhou Santai Testing Technology Co., Ltd., Guangdong Province Zhongshan Quality Metrology Supervision and Inspection Institute, Zhejiang Smart Health Lighting Research Center, Ningbo Product and Food Quality Inspection Institute (Ningbo Fiber Inspection Institute), Hangzhou Quality and Metrology Science Institute, Fushun China Coal Technology and Engineering Inspection Center Co., Ltd., Hangzhou Lin'an District Product Quality Monitoring Center, Zhejiang University School of Medicine Second Affiliated Hospital Ophthalmology Center, Damao Weirui Ke CAR LIGHTS LIMITED. The main drafters of this document are. Mu Xi, Chen Shengsen, Sun Chao, Mou Tongsheng, Miao Fei, Xie Wei, Wang Xinyue, Peng Zhenjian, Ye Kai, Zhu Tengfei, Hu Qiuhong, Zhang Hongkui, Sheng Jie, Liu Haitao, Chen Yu, Shen Ting, and Qin

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GB/T 30117.1-2024, IEC 62471.2006 and other standards mainly stipulate the optical radiation of incoherent optical products such as lamps and lamp systems. The classification method of six types of eye and skin hazards and their risk levels does not take into account the light radiation risks caused by physiological changes in the human body at night. With the widespread application of artificial lighting products and information display terminals, people are exposed to more light at night. Therefore, the development of an evaluation method for the impact of nighttime blue light radiation on the human body is beneficial to protecting public health. It will not only improve people's health, but also help promote the development of related industries. Compared with daytime, the visual response and physiological state of the human body at night are quite different. The pupil is relatively small (2mm~3mm); in low-light conditions at night, the pupil will dilate to 7mm. The avoidance reaction time of light is fast. According to GB/T 30117.1-2024, IEC 62471.2006 and other standards, the avoidance reaction time is 0.25s; The human body reacts slowly during the day, and the avoidance time to high brightness light will exceed 0.25s. High-brightness and strong light products are safe and may pose a higher risk when used at night. Guidelines for Exposure Limits for Incoherent Visible and Infrared Radiation Published by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) (ICNIRP.2013) The retinal blue light hazard limit in GB/T 30117.1-2024 and the classification of light radiation hazard risk levels in GB/T 30117.1-2024 are combined with the night Human eye status. From the perspective of human non-visual physiology, exposure to strong blue light at night can cause the non-visual signal of light to inhibit the secretion of melatonin. The International Commission on Illumination (CIE) released CIES026 in.2018. 2018, the document describes the five photoreceptors stimulated by light radiation through intrinsically photosensitive retinal ganglion cells, which produce non-visual responses to human life. At the same time, it specifies the relevant parameters for evaluating the effects of light radiation on human physiology. This document's assessment of the safety of blue light radiation at night is based on the differences in the human body's nighttime vision and physiology. The purpose of this document is to guide manufacturers to produce light radiation products that meet the requirements of safe nighttime use, and to encourage users to use them correctly at night. Light and maintain good lighting habits. Evaluation method of blue light radiation hazard at night

1 Scope

GB/T 45239-2025 gives the Chinese methods for evaluating the hazards of blue light radiation at night. The subject is topical and unusually contested: the shift to white LED lighting and to self-luminous displays has raised the short-wavelength content of the light people are exposed to after dark, and two distinct effects have to be separated, the photochemical retinal hazard, which is an optical safety question with an established weighting function, and the physiological or circadian effect, the suppression of melatonin

and the disturbance of sleep, which uses a different action spectrum entirely. The standard sets the evaluation criteria for both, the retinal hazard of blue light at night and the physiological hazards, and then the measurement and calculation methods: the spectral measurement of the source or the illuminance at the eye, the application of each weighting function, the derivation of the hazard quantities, the exposure conditions to be assumed, and the classification and reporting of the result. It takes effect on 1 August 2025.

This document specifies the classification and evaluation conditions of nighttime blue light radiation hazards, and describes the evaluation method of nighttime blue light radiation hazards. This document is applicable to the evaluation of blue light hazards to the retina and physiological hazards of blue light at night. This document applies to the evaluation of incoherent optical radiation. This document is intended for people with normal eye conditions. This document does not consider other special situations that may cause optical radiation hazards, such as.

a) distracting light;

c) flash blindness;

d) light flickering;

e) Exposure to photosensitive chemicals or consumption of photosensitive drugs;

f) children under three years old;

g) Abnormal personal behavior, such as intentionally staring at a strong light source, abnormal behavior caused by alcohol or drugs, etc.

2 Normative references

The contents of the following documents constitute the essential clauses of this document through normative references in this document. For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to This document.

GB/T 2900.65-2023 Electrical terminology lighting

GB/T 30117.1-2024 Photobiological safety of incoherent light products Part

3 Terms and definitions

The terms and definitions defined in GB/T 2900.65-2023, GB/T 30117.1-2024 and CIES026.2018 and the following terms and definitions apply in this document.

3.1 Light irradiation with a wavelength of 300nm~700nm (mainly 400nm~500nm) may cause photochemical damage to the retina.

3.2 The wavelength of light is 370nm~730nm (mainly 410nm~560nm). Since the ganglion photoreceptor cells on the retina are The dominant non-visual response may cause physiological harm to the human body.