GB

NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

ICS 29.140

K 70

GB/T 20145-2006 / CIE S 009/E:2002

Photobiological Safety of Lamps and Lamp Systems

(CIE S 009/E:2002, IDT)

灯和灯系统的光生物安全性

Issued on: March 6, 2006 **Implemented on: November 1, 2006**

Issued by: General Administration of Quality Supervision, Inspection and Quarantine;

Standardization Administration of the People's Republic of China.

Table of Contents

Foreword 3
Introduction 4
1 Scope 5
2 Normative References 5
3 Definitions, Symbols and Abbreviations 5
4. Exposure Limits 14
5 Measurement of Lamps and Lamp Systems 26
6 Lamp Classification 35
Annex A (Informative) Summary of Biological Effect 39
Annex B (Informative) Measurement Method 48
Annex C (Informative) Uncertainty Analysis 53
Bibliography 55

Foreword

This Standard equivalently adopted CIE S 009/E:2002 *Photobiological Safety of Lamps and Lamp Systems* (English version).

In addition, this Standard made the following editorial modifications:

a) Change “this International Standard” into “this Standard”;

b) Use decimal point “.” to replace the comma “,” that is used as decimal point;

c) Delete the Foreword of CIE S 009/E:2002.

The Appendixes A, B, and C of this Standard are informative.

This Standard was proposed by China National Light Industry Council.

This Standard shall be under the jurisdiction of National Technical Committee on Lighting Appliances of Standardization Administration of China (SAC/TC 224).

Drafting staffs of this Standard: National Lighting Test Center (Beijing); and Zhejiang University SENSING Instruments Co., Ltd.

Chief drafting staffs of this Standard: Zhang Ying, Hua Shuming, Mu Tongsheng.

This Standard is first-time formulated.

Photobiological Safety of Lamps and Lamp Systems

1 Scope

This Standard gives guidance for evaluating the photobiological safety of lamps and lamp systems including luminaires. Specifically, it specifies the exposure limits, reference measurement technique and classification scheme for the evaluation and control of photobiological hazards from all electrically powered incoherent broadband sources of optical radiation, including LEDs but excluding lasers, in the wavelength range from 200 nm through 3000 nm.

2 Normative References

The provisions in following documents become the provisions of this Standard through reference in this Standard. For dated references, the subsequent amendments (excluding corrigendum) or revisions do not apply to this Standard, however, parties who reach an agreement based on this Standard are encouraged to study if the latest versions of these documents are applicable. For undated references, the latest edition of the referenced document applies.

CIE 17.4:1987 International lighting vocabulary (ILV) – Joint publication IEC/CIE

CIE 53:1982 Methods of characterizing the performance of radiometers and photometers

CIE 63:1984 The spectroradiometric measurement of light sources

CIE 105:1993 Spectroradiometry of pulsed optical radiation sources

ISO Guide to the expression of uncertainty in measurement, ISO, Geneva, 1995. ISBN 92-67-10188-9

3 Definitions, Symbols and Abbreviations

For the purposes of this standard, the following definitions, symbols and abbreviations apply.

3.1 Actinic dose

Quantity obtained by weighting spectrally the dose according to the actinic action spectrum value at the corresponding wavelength.

While irradiance measurements are routinely performed, radiance measurements are not routine and often difficult to make, especially for the photobiological hazards, as they involve a field of view that changes depending on the hazard evaluation.

For these reasons it was thought necessary to include a rather lengthy discussion on the conditions and procedures needed to make emission measurements that will be used to assign risk group classification of various lamps and lamp systems.

It should be noted that the measurement procedures described in this standard are designed to account for biophysical phenomena. Specifically, they can involve averaging over apertures or field-of-views which would be considered inappropriate for general radiometric measurements. However, hazards might be overestimated if non-averaged measurement values were to be compared with the respective exposure limits.

To better provide a comparison of the various exposure limits, developed in clause 4.3, including the effects of the field-of-view, both a tabular and graphical summary are shown at the end of this clause. Thus Figure 6 and Table 3 summarizes the maximum values for each of the irradiance-based hazard exposure quantities as a function of exposure time, while Figure 7 and Table 4 summarizes the maximum radiance based (retinal) hazard exposure quantities, also as a function of exposure time.

NOTE: The upper wavelength range for evaluation of any hazard is given as 3000 nm in clause 1. Spectral irradiance or radiance measurements using a monochromator are often difficult to make in the IR, particularly between 2500 and 3000 nm due to a lack of signal response and difficulty in obtaining calibrated sources. However, no weighting function is defined at wavelengths greater than 1400 nm. Thus, broadband measurements for wavelengths between 1400 and 3000 nm are suitable in evaluating IR hazard conditions for the eye and skin in this region.

5.1 Measurement conditions

Measurement conditions shall be reported as part of the evaluation against the exposure limits and the assignment of risk classification.

5.1.1 Lamp ageing

To maintain stable output during the measurement process and provide reproducible results, lamps shall be seasoned for an appropriate period of time. During the initial period of operation, a lamp output characteristic will change as its components come to near equilibrium. If measurements are taken of an unseasoned lamp, the variations within the measurement period and between measurements could be significant. As the output of a lamp generally decreases over life, the seasoning time should be short to result in conservative hazard evaluations.

Seasoning of lamps shall be done as stated in the appropriate IEC lamp standard.

NOTE: The seasoning time for discharge lamps, e.g., fluorescent or High Intensity Discharge (HID) types, is typically 100 h, for tungsten lamps it is on the order of one percent of rated lamp life. However,

This is an excerpt of the PDF (Some pages are marked off intentionally)

------ The End ------