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ANSI/IES RP-27.3-17

Recommended Practice for Photobiological Safety for Lamps – Risk Group Classification and Labeling

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**Recommended Practice
for Photobiological Safety
for Lamps – Risk Group
Classification and Labeling**

Publication of this Recommended Practice
has been approved by IES.
Suggestions for revisions
should be directed to IES.

Prepared by: IES Photobiology Committee

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1.0 INTRODUCTION

This standard is the third in a series of standards relating to the photobiological safety of lamps and lamp systems and is devoted to optical safety. Lamps, with associated systems, were developed and produced in large quantities and became commonplace in an era when industry-wide safety standards were not common. The evaluation and control of lamp hazards is a more complicated subject than similar tasks for a single-wavelength laser system, where only one optical hazard might apply. The required radiometric measurements are quite involved, for they do not deal with the simple optics of a point source, but rather with an extended source which may or may not be altered by diffusers or projection optics. Also, the wavelength distribution of the lamp may be altered by ancillary elements, diffusers, lenses, and the like, as well as by variations in operating conditions.

To evaluate a broad-band optical source, such as an arc lamp, an incandescent lamp, a fluorescent lamp, LED (light emitting diode) singly or in an array, or a lamp system, it is necessary to determine the spectral distribution of accessible optical radiation emitted from the source. This accessible emission spectral distribution of interest for a lamp system may differ from that actually being emitted by the lamp alone due to the filtration by any optical elements (e.g., projection optics) in the light path. Secondly, the size, or projected size, of the source must be characterized for the radiance hazard. Thirdly, it may be necessary to determine the variation of irradiance and projected radiance (see glossary) with distance. The performance of the necessary measurements is normally not an easy task without sophisticated instruments. Users must normally rely on the expertise of the manufacturers for information on lamps and lamp systems. General safety requirements and reference measurement techniques for lamp and specific lamp systems are provided in other standards of this IES RP-27¹ series.

Finally, there are well known optical radiation hazards associated with some lamps and lamp systems. Maximum exposure (threshold) limits for a number of radiation hazards for broad-band radiation sources have been developed and published by both the International Commission on Non-Ionizing Protection (ICNIRP)² and the American Conference of Governmental Industrial Hygienists (ACGIH)³. While the exposure limits, measured in either time-integrated irradiance or radiance, form the basis on which to evaluate the risk of photobiological injury, the limits of the lamp or lamp system emission, measured in either irradiance or

radiance, are the topics dealt with in this standard. The relationships between exposure limits and emission limits form a significant part of the risk group categorization developed.

The purpose of the IES RP-27 series of standards is to inform the public and original equipment manufacturers (OEM) about potential radiation hazards that may be associated with various lamps and lamp systems. It is also the purpose of these standards to provide guidance, advice and standard methods for evaluating and informing the user, both the public and the OEM, about the potential optical radiation hazards that may be associated with these products.

The purpose of this standard (ANSI/IES RP-27.3-17) is to provide the criteria for proper categorization, classification, and informational requirements of lamps so that such sources may be properly applied in the design of lamp systems.

2.0 SCOPE

This standard covers the classification, labeling and informational requirements for lamps that emit optical radiation in the wavelength range from 200 nm to 3,000 nm, with exception for LED diodes used in optical fiber communication systems and for lasers. Lamps included are incandescent filament lamps including tungsten halogen types and incandescent heating sources, low pressure discharge lamps, high intensity discharge (HID) lamps, short arc lamps, carbon arcs, electroluminescent lamps, light-emitting diodes (LEDs), organic light emitting diodes (OLEDs) and laser-driven broadband sources. For the purposes of this document, induction lighting is classified under fluorescent lamps and plasma lighting is classified under HID lamps. Federal mandatory requirements for lamps subject to specific Federal Regulations take precedence over requirements included in this consensus standard.

Note 1: Units of wavelength in this document are exclusively in nanometers (nm).

Note 2: Subtended angles are denoted by the full included angle, not the half angle.

3.0 NORMATIVE REFERENCES

- ANSI/IES RP 27.1-15¹
- ANSI/IES RP 27.2-00/R10¹