This is a preview of "ANSI/IES RP-27.1-15". Click here to purchase the full version from the ANSI store.

Illuminating ENGINEERING SOCIETY

ANSI/IES RP-27.1-15

Recommended Practice for Photobiological Safety for Lamps and Lamp Systems –General Requirements

Approved American National Standard ANSI

This is a preview of "ANSI/IES RP-27.1-15". Click here to purchase the full version from the ANSI store.

ANSI/IES RP-27.1-15

Recommended Practice for Photobiological Safety for Lamps and Lamp Systems – General Requirements

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

Prepared by:
The Photobiology Committee of the
Illuminating Engineering Society of North America

This is a preview of "ANSI/IES RP-27.1-15". Click here to purchase the full version from the ANSI store.

Copyright 2015 by the Illuminating Engineering Society of North America.
Approved by the IES Board of Directors, August 18, 2015 as a Transaction of the Illuminating Engineering Society of North America.

Approved as an American National Standard, November 6, 2015.

All rights reserved. No part of this publication may be reproduced in any form, in any electronic retrieval system or otherwise, without prior written permission of the IES.

Published by the Illuminating Engineering Society of North America, 120 Wall Street, New York, New York 10005.

IES Standards and Guides are developed through committee consensus and produced by the IES Office in New York. Careful attention is given to style and accuracy. If any errors are noted in this document, please forward them to the IES Technical Director of Standards, at the above address for verifi¬cation and correction. The IES welcomes and urges feedback and comments.

ISBN # 978-0-87995-321-8

Printed in the United States of America.

DISCLAIMER

IES publications are developed through the consensus standards development process approved by the American National Standards Institute. This process brings together volunteers representing varied viewpoints and interests to achieve consensus on lighting recommendations. While the IES administers the process and establishes policies and procedures to promote fairness in the development of consensus, it makes no guaranty or warranty as to the accuracy or completeness of any information published herein.

The IES disclaims liability for any injury to persons or property or other damages of any nature whatsoever, whether special, indirect, consequential or compensatory, directly or indirectly resulting from the publication, use of, or reliance on this document.

In issuing and making this document available, the IES is not undertaking to render professional or other services for or on behalf of any person or entity. Nor is the IES undertaking to perform any duty owed by any person or entity to someone else. Anyone using this document should rely on his or her own independent judgment or, as appropriate, seek the advice of a competent professional in determining the exercise of rea¬sonable care in any given circumstances.

The IES has no power, nor does it undertake, to police or enforce compliance with the contents of this doc¬ument. Nor does the IES list, certify, test or inspect products, designs, or installations for compliance with this document. Any certification or statement of compliance with the requirements of this document shall not be attributable to the IES and is solely the responsibility of the certifier or maker of the statement.

This is a preview of "ANSI/IES RP-27.1-15". Click here to purchase the full version from the ANSI store.

Recommended Practice for Photobiological Safety for Lamps and Lamp Systems - General Requirements

Prepared by
The IES Photobiology Committee

David Sliney, *Chair*

R. Bergman	H. Hoover*	S. Mintz	J. Urbanowski*
G. Brainard	A. Jackson	J. O'Hagan	R. Vincent
J. Bullough	A. Kim*	M. Phillips*	S. Wengraitis
D. Burnett*	R. Landry*	T. Pocock	M. Wolbarsht*
G. Costa*	R. Levin	J. Roberts*	V. Wu*
R. Daubach*	A. Lewis*	R. Sayre	E. Yandek
J. Dowdy	T. Lyon	J. Sheehy	S. Zigman*
J. Fischer*	M. Mainster*	R. Soler*	
P. Forbes	N. Miller*	K. Stekr*	
D. Gross	S. Miller	A. Thompson	* Advisory

AMERICAN NATIONAL STANDARD

Approval of an American National Standard requires verification by ANSI that the requirements for due process, consensus, and other criteria have been met by the standards developer.

Consensus is established when, in the judgment of the ANSI Board of Standards Review, substantial agreement has been reached by directly and materially affected interests. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that a concerted effort be made toward their resolution.

The use of American National Standards is completely voluntary; their existence does not in any respect preclude anyone, whether that person has approved the standards or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standards.

The American National Standards Institute does not develop standards and will in no circumstances give an interpretation to any American National Standard. Moreover, no person shall have the right or authority to issue and interpretation of an American National Standard in the name of the American National Standards Institute. Requests for interpretations should be addressed to the secretariat or sponsor whose name appears on the title page of this standard.

CAUTION NOTICE: This American National Standard may be revised at any time. The procedures of the American National Standards Institute require that action be taken to reaffirm, revise, or withdraw this standard no later than five years from the date of approval. Purchasers of American National Standards may receive current information on all standards by calling or writing the American National Standards Institute.

This is a preview of "ANSI/IES RP-27.1-15". Click here to purchase the full version from the ANSI store.

This is a preview of "ANSI/IES RP-27.1-15". Click here to purchase the full version from the ANSI store.

Please refer to the IES Bookstore after you purchase this IES Standard, for possible
Errata, Addenda, and Clarifications, www.ies.org/bookstore

Contents

This is a preview of "ANSI/IES RP-27.1-15". Click here to purchase the full version from the ANSI store.

This is a preview of "ANSI/IES RP-27.1-15". Click here to purchase the full version from the ANSI store.

1.0 INTRODUCTION

Lamps 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 far more complicated subject than similar tasks for a single-wavelength laser system. 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 optical elements, diffusers, lenses, and the like, as well as variations in operating voltage.

To evaluate a broad-band optical source, such as an arc lamp, an incandescent lamp, a fluorescent lamp, an array of lamps or a lamp system, it first is necessary to determine the spectral distribution of optical radiation emitted from the source at the point or points of nearest human access. This accessible emission spectral distribution of interest for a lighting 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 should be characterized in the retinal hazard spectral region. Thirdly, it may be necessary to determine the variation of irradiance and projected radiance (see the **Glossary**) with distance. The performance of the necessary measurements is not an easy task without sophisticated instruments. Users should normally rely upon the expertise of manufacturers for information on lamps and lamp systems. Safety requirements and reference measurement techniques for lamps and specific lamp systems are provided in later standards of this series (i.e., *ANSI/IES RP-27.2-00/R2010 Recommended Practice for Photobiological Safety for Lamps & Lamp Systems – Measurement Techniques and ANSI/IES RP-27.3-07 Recommended Practice for Photobiological Safety for Lamps – Risk Group Classification Labeling*).

Finally, there are well known optical radiation hazards associated with some lamps and lamp systems. The purpose of these standards is to inform the public and original equipment manufacturers (OEMs) 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.

2.0 SCOPE

This Recommended Practice covers the evaluation and control of optical radiation hazards from all electrically powered sources of optical radiation that emit in the wavelength range from 200 nm through 3,000 nm (3.0 um [micrometers]) except for light emitting diodes (LEDs) used in optical fiber communication systems and for lasers which are covered in a separate series of ANSI (American National Standards Institute) standards (Series Z136). Federal mandatory requirements for lamps subject to specific Federal Regulations take precedence over requirements in subsequent standards included in this series.

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 DEFINITIONS

For standard nomenclature and definitions, radiometric and photometric quantities, and illuminating engi-neering terminology, refer to *ANSI/IES RP-16-2010, Nomenclature and Definitions for Illuminating Engineering*. Certain frequently used terms are defined in the **Glossary**.

3.1 Assessment Distance

Distance for Risk Group classification is based upon reasonably foreseeable worst-case exposure. This is not generally the measurement distance, e.g., the distance to an illuminance of >500 lx (46.5 fc) for a GLS (general lighting source) lamp or luminaire.

3.2 Blue Light Hazard

There is potential for a photochemically induced retinal injury resulting from radiation exposure at wavelengths primarily between 400 nm and 500 nm. This damage mechanism dominates over thermal for times exceeding **10 s** (see **Annex Section A3.3** for Ham reference).

3.3 Continuous Wave (CW) Lamp

Defined as a lamp that is operated with a continuous output for a **0.25 s** period of time or greater, i.e., a non-pulsed lamp (see **Section 3.15**). In this standard, GLS lamps are defined to be Continuous Wave lamps.