



**RECOMMENDED PRACTICE:**  
**RISK GROUP CLASSIFICATION AND**  
**MINIMIZATION OF PHOTOBIOLOGICAL**  
**HAZARDS FROM ULTRAVIOLET**  
**LAMPS AND LAMP SYSTEMS**  
**AN AMERICAN NATIONAL STANDARD**

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**ANSI/IES RP-27.1-22**

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

**Prepared by the  
IES Photobiology Committee**



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Approved by the IES Standards Committee, August 10, 2022, as a Transaction of the Illuminating Engineering Society.

Approved October 28, 2022, as an American National Standard.

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

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Printed in the United States of America.

ISBN 978-0-87995-445-1

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## 1.0 Introduction and Scope

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### 1.1 Introduction

The purpose of this Recommended Practice is to summarize the photobiological hazards of exposure to ultraviolet (UV) radiation and to provide recommendations to minimize the risks of such effects from ultraviolet lamps and lamp systems.

Although most lamps and lamp systems (see **Sections 3.18** and **3.19**) are safe and pose no photobiological risks except under unusual exposure conditions, one group of products—ultraviolet lamp systems—may pose optical radiation hazards during use that require risk assessment for direct and indirect exposure of the eyes and skin. Optical radiation hazards from all types of lamps or other broadband light sources are assessed by application of *ANSI/IES RP-27-20, Lighting Science: Photobiological Safety of Lamps and Lamp Systems*<sup>1</sup> (combined from the previously separate ANSI/IES RP-27.1-15, ANSI/IES RP-27.2-00(R2017), and ANSI/IES RP-27.3-17). It addresses LEDs, incandescent, low- and high-pressure gas-discharge, arc, and other lamps. ANSI/IES RP-27.1-22 expands this information by covering lamp systems that are designed primarily to emit ultraviolet radiant energy, such as ultraviolet sources intended to excite fluorescence of irradiated materials, as used in insect light traps, scientific studies, mineral identification, non-destructive testing, germicidal irradiation, and other purposes.

This document provides risk group classification for all ultraviolet lamp systems, and the measurement conditions for different applications, thus superseding the more general risk group classifications used in ANSI/IES RP-27-20 for UV lamp systems. It includes manufacturing and user safety requirements that may be required as a result of an ultraviolet lamp system being assigned to a particular risk group. The assigned risk group of an ultraviolet lamp system also may be used to assist with any needed risk assessments, e.g., for occupational exposure in workplaces.

### 1.2 Scope

Recommendations in this document apply only to lamps and lamp systems designed primarily to emit

ultraviolet (UV) radiant energy for consumer, industrial, scientific, and medical applications. The scope is limited to lamps and lamp systems where more than half of the optical radiation emitted between 180 nm and 3,000 nm is in the spectral region 180 nm to 400 nm. If more than half of the optical radiation emitted between 180 nm to 3,000 nm is outside of the spectral region 180 nm to 400 nm, then the base standard, ANSI/IES RP-27-20, applies.

ANSI/IES RP-27.1-22 does not apply to general lighting sources (GLS) or laser systems.

## 2.0 Normative References

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### 2.1 ANSI/IES LS-1-22

Illuminating Engineering Society. *Lighting Science: Nomenclature and Definitions for Illuminating Engineering*. New York: IES; 2022.

### 2.2 ANSI/IES RP-27-20

Illuminating Engineering Society. *Recommended Practice: Photobiological Safety for Lighting Systems*. New York: IES; 2020.

### 2.3 ANSI/IES RP-44-21

Illuminating Engineering Society. *Recommended Practice: Ultraviolet Germicidal Irradiation (UVGI)*. New York: IES; 2021.

## 3.0 Definitions

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Standard nomenclature and definitions, radiometric and photometric quantities, and illuminating engineering terminology are found in *ANSI/IES LS-1-22, Lighting Science: Nomenclature and Definitions for Illuminating Engineering* (see **Section 2.1**). Other definitions found in ANSI/IES RP-27-20 (see **Section 2.2**) may also apply.

### 3.1 actinic radiation hazard

Optical radiation, most notably UV-B and UV-C, capable of producing a photobiological effect. The relative