



NEMA LSD EB 84-2021

## ***Germicidal Irradiation and the Energy Codes***

Prepared by

NEMA Lighting Systems Division  
**National Electrical Manufacturers Association**  
1300 North 17th Street, Suite 900  
Rosslyn, Virginia 22209  
Approved: March 16, 2021

### **Disclaimer**

The requirements or guidelines presented in this document, a NEMA Lighting Systems Division white paper, are considered technically sound at the time they are approved for publication. They are not a substitute for a product seller's or user's own judgment with respect to the particular product discussed, and NEMA does not undertake to guarantee the performance of any individual manufacturer's products by virtue of this document or guide. Thus, NEMA expressly disclaims any responsibility for damages arising from the use, application, or reliance by others on the information contained in these white papers, Standards, or guidelines.

The opinions expressed in this statement represent the consensus views of the Member companies of the Lighting Systems Division of the National Electrical Manufacturers Association. The Members of the Lighting Systems Division manufacture indoor and outdoor lamps, which include: incandescent, fluorescent, light-emitting diode, and solid-state lamps, lighting fixtures, and lamp ballasts.

## Background

Germicidal irradiation is the process of inactivating pathogens with a radiating energy source. In most cases, the intent of germicidal irradiation is to guard against detrimental health effects from molds, spores, bacteria, viruses, fungi, and similar living and non-living pathogens. Common germicidal radiating energy sources are sometimes referred to as germicidal lighting, germicidal ultraviolet (GUV), or germicidal ultraviolet irradiation (GUVI). These sources emit electromagnetic (EM) energy in the ultraviolet and visible light portions of the spectrum. In practice, electromagnetic radiation outside the visible light spectrum is not considered “lighting.” The term lighting applies to visible light produced by luminaires that enables humans to see and complete visual tasks.

Material surfaces and circulating air within buildings can be irradiated or exposed to a germicidal irradiation source, resulting in the inactivation of pathogens on those surfaces or in the air. Depending on the specific spectrum, intensity, distance, and duration of exposure (i.e., the germicidal irradiation dose), a system may claim effective inactivation of specific pathogens in specific situations. Germicidal irradiation sources are increasingly used in commercial building environments to disinfect and reduce the risk of disease spread. Germicidal irradiation used in buildings does consume energy to provide this special service and does not provide any lighting for visual tasks; lighting for visual tasks is governed by energy efficiency Standards and codes when adopted by a jurisdiction.

This document outlines the positions of the three primary energy efficiency Standards with respect to germicidal irradiation in commercial buildings.

## ASHRAE/IES Standard 90.1

ASHRAE/IES 90.1 *The Energy Standard for Buildings, Except Low-Rise Residential Buildings*, is an ANSI-process developed Standard by Standing Standard Project Committee 90.1 comprised of subject matter experts in architecture, building systems, code enforcement, and technology. It is the Federal energy efficiency Standard for the construction of commercial buildings. The lighting power of certain equipment and applications is exempt from the 90.1 Standard. Interpretation IC of 90.1-2016-8 was approved by ASHRAE SSPC 90.1 on this subject. It states:

“The use of antimicrobial lighting [*sic*] application for disinfection of a space follows the spirit and meaning of specific exemptions within the exemption list of 9.2.2.3 for Interior Lighting Power Allowance and should be included as an exemption as long as it is in addition to general lighting and is controlled by an independent control device.”

The 90.1 Committee further clarified, “In a dual-function luminaire, only the wattage for the antimicrobial function is exempt.” Although the interpretation uses the terminology of antimicrobial lighting [*sic*], this is considered synonymous with the term germicidal irradiation.

In summary, the ASHRAE/IES 90.1 Standard exempts the power used for germicidal irradiation in commercial buildings. The exemption applies whether a dual-function luminaire that also provides lighting for visual tasks is installed or a separate, dedicated germicidal irradiation luminaire or system is installed. If a dual-function luminaire is installed, the power for the germicidal irradiation must be controlled independently of the general lighting control.

## International Energy Conservation Code

The International Energy Conservation Code (IECC) is a widely adopted energy efficiency code used by states and local jurisdictions throughout the United States. The IECC development process is publicly open with proposed code revisions adopted by qualified voting government officials. The Electrical Power and Lighting Systems Section (section C405 in the 2018 IECC) neither has a specific exemption for germicidal irradiation nor specifically governs its power.

The administration section of the IECC, Section C102.1 permits the use of alternative materials, design, and methods of construction and equipment by stating the code is “not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically

prescribed by this code, provided that any such alternative has been *approved*<sup>1</sup>.” Therefore, the code does not prevent the installation of germicidal irradiation equipment or regulate its power.

In the approved language for the 2021 IECC Section C405.3.1, a new exemption for germicidal irradiation has been included:

20. Antimicrobial lighting [*sic*] used for the sole purpose of disinfecting a space.

Although the new addition to the code uses the terminology of “antimicrobial lighting,” this term is considered synonymous with the germicidal irradiation.

In summary, the 2021 IECC exempts the power used for germicidal irradiation in commercial buildings for the purpose of disinfecting a space.

## California Title 24 Part 6

California’s state energy code, The Building Energy Efficiency Standards (Title 24 Part 6), is developed through an open stakeholder process with final decisions and adoptions under the responsibility of the California Energy Commission. Title 24 2019 is in effect in California through December 31, 2022.

From Title 24 Part 6 2019, Section 100.1 Definitions and Rules of Construction, the following definitions for light and lighting help define the Standard’s scope for regulation of lighting power.

- a. **Light** is the luminous equivalent of power and is properly called luminous flux.
- b. **Luminous Flux** is visually evaluated radiant flux and defines “light” for purposes of lighting design and illuminating engineering.
- c. **Lighting**, or illumination, is the application of light to achieve some practical or aesthetic effect.

Since germicidal irradiation is not visually evaluated and not used for the purposes of lighting design or illumination, it falls outside the scope of Title 24 and therefore is not regulated by this Standard.

## Summary

Germicidal irradiation is a rapidly deploying technology in buildings across the country with the specific and special purpose of inactivating pathogens. While this technology requires energy to operate, it is exempted from the scope of the energy codes. It is expected that future versions of the codes will have refined language for germicidal irradiation; comments from each of the Standard development organizations have indicated that germicidal irradiation should remain exempt from energy requirements.

§

---

<sup>1</sup> Acceptable to the code official.