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ANSI/ASHRAE Standard 185.4-2024
Method of Testing In-Room Ultraviolet Devices and Systems for Microbial Inactivation on Surfaces in a Test Room

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NOTE

Approved addenda, errata, or interpretations for this standard can be downloaded free of charge from the ASHRAE website at www.ashrae.org/technology.

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(This foreword is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)

FOREWORD

Standards Project Committee (SPC) 185.4 was organized in 2022 to develop a method of test to determine inactivation efficacy of microorganisms on surfaces exposed to ultraviolet (UV) irradiance.

ANSI/ASHRAE Standard 185.4 is a test method standard, and its results are to be used to directly compare UVGI equipment on a standardized basis, irrespective of their application. Results are also used to give the design engineer an easy-to-use basis for specifying UV devices or estimating the relative performance of UVGI equipment for a given application as it pertains to surface applications. It is entirely possible that an industry organization may use this test method as the basis for an application standard in which they might require testing at conditions different than those required in this standard.

This test method is to be performed by persons with training in microbiology in facilities designed and equipped for work with infectious agents at the appropriate biosafety level (see the most recent edition of the CDC's Biosafety in Microbiological and Biomedical Laboratories*). It is the responsibility of the investigator to determine whether Good Laboratory Practice Regulations are required and to follow them when appropriate (see 40 CFR, Part 160, for EPA submissions and 21 CFR, Part 58, for FDA submissions).*

This standard does not purport to address all of the safety concerns associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.

***NOTE:** Informative notes are used throughout this standard to provide nonmandatory guidance for the user in addition to the nonmandatory guidance found in informative appendices. Informative notes are for information only and are not part of the standard.*

1. PURPOSE

This standard establishes a test method for evaluating the efficacy of germicidal ultraviolet systems for microbial inactivation on multiple surface locations in a test room.

2. SCOPE

2.1 This standard applies to ultraviolet devices and systems using only germicidal ultraviolet energy for inactivation.

2.2 The method of test specifies selected indicator microorganisms and defines procedures for inoculating test carriers in a room-scale test chamber.

2.3 The method of test defines the test carrier quantity and positions in the test room.

2.4 This standard provides a method for counting the number of viable microorganisms on the test carriers before and after ultraviolet inactivation.

2.5 This standard establishes protocols and minimum requirements for the materials and equipment required to conduct the tests, defines methods of calculating and reporting results obtained from the test data, and establishes a reporting system to be applied to in-room devices and systems covered herein.

2.6 This standard does not address the health and safety effects of operating devices and systems in an occupied room.

3. DEFINITIONS AND ACRONYMS

3.1 Definitions. Some terms in this list are defined for the purposes of this standard. When definitions are not provided, common usage shall apply.

***burn-in time*:** a period of time that ultraviolet (UV) lamps are powered on prior to putting the lamps into service, typically 100 hours.

carrier: substrate on which test microbes are deposited.

germicidal: capable of killing or inactivating microorganisms.

germicidal UV (GUV): Ultraviolet (UV) radiation with a wavelength between 100 nm and 280 nm.

***irradiance*:** the power of electromagnetic radiation incident on a surface per unit surface area, typically reported in microwatts per square centimeter ($\mu W/cm^2$).

***reflectivity*:** the fraction of incident radiation reflected by a surface.