



STANDARD

ANSI/ASHRAE Standard 185.2-2014

Method of Testing Ultraviolet Lamps for Use in HVAC&R Units or Air Ducts to Inactivate Microorganisms on Irradiated Surfaces

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NOTE

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FOREWORD

Test standards form the foundation for air-cleaner selection in the ventilation industry. Recent EPA literature states that the most important need in the area of ultraviolet germicidal irradiation (UVGI) is industry standards to rate installed devices. Standards for testing and reporting on products under controlled conditions are essential for both users and specifiers to compare products, predict levels of performance under specified operating conditions with reasonable certainty, and determine appropriate UVGI efficiencies for specific situations. For these reasons, the development of standards has formed an important part of ASHRAE committee activity.

Historically, standards for testing air cleaners were developed in response to the needs of the times. Protection of machinery and coils came first, then reduction of soiling. Recent concerns about indoor air quality (IAQ) and respirable particles, protection of products during manufacture, and protection of HVAC equipment prompted development of test standards based on particle size. Current interest in controlling airborne infectious contaminants or viable species that produce chemical contaminants as metabolic byproducts has created the need to provide a test standard for UVGI equipment.

Standards Project Committee (SPC) 185 was first organized in 2005 to develop a method of test to determine inactivation rates of airborne microorganisms in air-handling units and air ducts. In 2007 it was divided into SPC-185.1 (Method of Testing UVC Lights for Use in Air Handling Units or Air Ducts to Inactivate Airborne Microorganism) and SPC-185.2 (Method of Testing Ultraviolet Lamps for Use in HVAC&R Units or Air Ducts to Inactivate Microorganisms on Irradiated Surfaces).

This 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 for a given application. 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.

1. PURPOSE

This standard establishes a test method for measuring the intensity of ultraviolet lamps on irradiated surfaces under typical HVAC&R operating conditions.

2. SCOPE

2.1 This standard describes a method of laboratory testing to measure the ultraviolet C (UV-C) irradiance of ultraviolet lamps used in HVAC&R systems.

2.2 This standard also

- a. defines methods of calculating and reporting results obtained from the test data, and
- b. establishes a reporting system to be applied to ultraviolet lamps covered by this standard.

3. DEFINITIONS

Terms are defined below for the purposes of this standard. When definitions are not provided, common usage shall apply.

burn-in time: a period of time that UV lamps are powered on prior to putting the lamps into service.

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

mercury vapor lamp: a lamp in which light is produced by an electric arc between two electrodes in an ionized mercury-vapor atmosphere; it gives off a bluish-green light rich in ultraviolet radiation

radiometer sensor grid: a nine-point cross-sectional grid with predetermined locations in which to mount the radiometer sensor head.

reflectivity: the fraction of incident UV-C radiation reflected by a surface.

ultraviolet (UV): ultraviolet electromagnetic radiation, which has a wavelength in the range of 100 to 400 nm. It can be subdivided into ultraviolet A (400 to 320 nm), ultraviolet B (320 to 280 nm), or ultraviolet C (280 to 100 nm) (see *ultraviolet C*).

ultraviolet C (UV-C): electromagnetic wavelength between 280 and 100 nm, also called *short wave* or *germicidal*. The germicidal UV wavelength (commonly 253.7 nm when generated using a mercury vapor lamp) falls into this UV band.

UV-C device: a complete assembly consisting of lamp(s), ballast(s), and supporting fixture. Also called *UV-C light(s)* in the configurations, as specified by the equipment provider.

4. TEST APPARATUS AND PROCEDURES

4.1 Mandatory and Discretionary Requirements. Critical dimensions and arrangements of the test apparatus are shown in the figures of this section. All dimensions shown are mandatory unless otherwise indicated, and either SI or I-P dimensions are acceptable for any element of the system. Units shown are in mm (in.) unless otherwise indicated. The design of equipment not specified, including, but not limited to blowers, valves, and external piping, is discretionary, but the equipment must have adequate capacity to meet the requirements of this standard.

4.2 Installation of UV-C Device. Installation of the ultraviolet C (UV-C) device, and configuration of the lamp assembly within the device, shall be as designated by the manufacturer or equipment provider. The burn-in time for lamps shall be 100 hours¹ and shall be performed by the test lab.

4.3 Test Duct. The test apparatus shown in Figure 4-1 is designed for test devices with nominal face dimensions of