IEC 60068-2-87

Edition 1.0 2024-10

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Environmental testing – Part 2-87: Tests – UV-C exposure of materials and components to simulate ultraviolet germicidal Irradiation or other applications

Essais d'environnement – Partie 2-87: Essais – Exposition des matériaux et composants aux UV-C pour simuler l'irradiation germicide aux ultraviolets ou d'autres applications

IEC 60068-2-87:2024 (en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 19.040

ISBN 978-2-8322-9871-8

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ENVIRONMENTAL TESTING –

Part 2-87: Tests – UV-C exposure of materials and components to simulate ultraviolet germicidal irradiation or other applications

FOREWORD

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IEC 60068-2-87 has been prepared by IEC technical committee 104: Environmental conditions, classification and methods of test. It is an International Standard.

The text of this International Standard is based on the following documents:

Draft	Report on voting
104/1067/FDIS	104/1073/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 60068 series, published under the general title *Environmental testing*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

INTRODUCTION

UV-C radiation (with wavelength ranging from 100 nm to 280 nm) emitted by the sun is known to destroy DNA and RNA in living cells, but it is filtered entirely by the atmosphere, so that none reaches Earth's surface. Because of its effects on cells, artificial light sources that emit UV-C radiation are used to kill or deactivate pathogens in air, water, and on material surfaces, a process known as ultra-violet germicidal irradiation (UVGI). Although UVGI systems for disinfection of water have been in use for decades, the technology's use on surfaces and in air has become common more recently and has accelerated in response to the COVID-19 pandemic.

UV-C radiation is potentially harmful to polymers, textiles, and other materials. Consequently, UVGI treatments can degrade material properties, especially when frequently performed.

The test procedure set out in this document is intended as a standardized method of evaluating the effects of UVGI on either samples of material or components, subsystems or complete systems of electrical equipment.

The severities are listed in order from lowest to highest expected UV-C radiation dose. A low severity environment represents materials exposed to UVGI treatments infrequently. Higher severity environments represent materials with more frequent exposures, including materials used within a UVGI system's components.

The majority of UVGI systems in use rely on low pressure mercury lamps, which emit most of their output at a single wavelength of 254 nm. This type of lamp is available in several power levels and in many physical configurations, but the spectral output is the same regardless of these factors. Other light sources are used in some UVGI systems, including excimer lamps with output at 222 nm and LEDs with output at 265 nm.

This document will be limited to applications using low pressure mercury lamps because the technology is very well known and commercial testing equipment using it is available.

ENVIRONMENTAL TESTING –

Part 2-87: Tests – UV-C exposure of materials and components to simulate ultraviolet germicidal irradiation or other applications

1 Scope

This part of IEC 60068 describes exposures of materials and components to UV-C radiation during ultraviolet germicidal irradiation (UVGI) treatments or other processes that require UV-C exposure and test procedures to simulate those environments. Severities representing various frequencies and intensities of UV-C exposures are described. Test conditions are described and limited to devices that utilize low pressure mercury lamps which emit most of their radiation at a single spectral line at 254 nm.

NOTE A more precise characterization of the wavelength of the spectral line is 253,7 nm. The ability for a laboratory to determine the wavelength to this resolution is rare. Therefore, this spectral line is often qualified to the resolution of 1 nm.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 4892-1, *Plastics – Methods of exposure to laboratory light sources – Part 1: General guidance*

ISO 9370:2017, *Plastics – Instrumental determination of radiant exposure in weathering tests – General guidance and basic test method*

ASTM G130, *Standard Test Method for Calibration of Narrow and Broad-Band Ultraviolet Radiometers Using a Spectroradiometer*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.1
low pressure mercury lamp
discharge lamp of the mercury vapour type, with or without a coating of phosphors, in which during operation, the partial pressure of the vapour does not exceed 100 Pa

Note 1 to entry: For the purposes of this document, low pressure mercury lamps do not contain any phosphors.