



Technical Specification

ISO/TS 4767

Plastics — Method of exposure to electrodeless plasma radiation sources

*Plastiques — Méthode d'exposition à des sources de rayonnement
plasma sans électrode*

**First edition
2024-01**

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Published in Switzerland

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 6, *Ageing, chemical and environmental resistance*.

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Plastics — Method of exposure to electrodeless plasma radiation sources

1 Scope

This document specifies methods for an accelerated photo-degradation test using an electrodeless plasma radiation source. This method is suitable for evaluating or predicting degradation and failure caused by the photo-degradation of a material and a product within a short-term period.

Specimen preparation and evaluation of the results are covered in other International Standards for specific materials.

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 4582, *Plastics — Determination of changes in colour and variations in properties after exposure to glass-filtered solar radiation, natural weathering or laboratory radiation sources*

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

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

3 Terms and definitions

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For the purposes of this document, the terms and definitions given in ISO 4892-1 and the following apply.

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

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

3.1

electrodeless plasma lamp

gas discharge lamp that produces radiation by radio frequency or electromagnetic field through the gas in a glass bulb without using metal electrodes

4 Principle

Electrodeless plasma lamps are used to simulate the UV part of global solar radiation.

Specimens can be exposed to various levels of radiation and heat under controlled environmental conditions.

The procedure(s) may include measurement of the irradiance and the radiant exposure in the plane of the specimen.

It is recommended that a similar material of known performance (a control) be exposed simultaneously with the test specimens to provide a standard for comparative purposes.

Inter-comparison of results obtained from specimens exposed in different apparatuses should not be made unless an appropriate statistical relationship has been established between the apparatuses for the particular material exposed.

5 Apparatus

5.1 Laboratory radiation source

5.1.1 General

Electrodeless plasma lamps emit high-intensity UV and low-intensity visible radiation. The irradiance intensity of these lamps can be adjusted to meet test conditions.

The UV spectrum of electrodeless plasma lamps shall meet the conditions listed in [Table 1](#).

5.1.2 Spectral irradiance of electrodeless plasma lamps

[Table 1](#) shows the values of the relative spectral irradiance within the UV region of electrodeless plasma lamps with 300 nm cut-on filter that simulate global solar radiation (CIE 241, CIE-H1^[1]).

Table 1 — Relative UV spectral irradiance of electrodeless plasma lamps with 300 nm cut-on filter applied

Spectral passband wavelength nm	Minimum %	CIE 241, CIE-H1 %	Maximum %
$\lambda < 290$	—	0	0,04
$290 \leq \lambda \leq 320$	3,2	5,9	8,0
$320 < \lambda \leq 360$	31,3	40,4	35,5
$360 < \lambda \leq 400$	54,7	53,8	65,3
For the solar spectrum given in CIE 241, CIE-H1 UV irradiance (290 nm to 400 nm) is 11 %, and visible light irradiance (400 nm to 800 nm) is 89 %, where the units are the percentage of the total irradiance at 290 nm to 800 nm.			

An example of the spectral irradiance of an electrodeless plasma lamp compared to global solar radiation is shown in [Annex A](#), [Figure A.1](#).

5.1.3 Irradiance uniformity

Exposure devices shall be designed such that the irradiance at any location in the area used for specimen exposures is at least 90 % of the maximum irradiance measured in this area. If these conditions are not met, refer to ISO 4892-1 to periodically adjust the test specimen position.

NOTE For some materials with high reflectivity, or with high sensitivity to irradiance and temperature, periodic repositioning of specimens is recommended to ensure uniformity of exposures, even when the irradiance uniformity in the exposure area is within the limits so that repositioning is not required.

5.2 Test chamber

The design of the exposure chamber can vary, but it shall be constructed from inert material and provide uniform irradiance in accordance with [5.1.3](#), with means for controlling the temperature.

5.3 Radiometer

When a radiometer is used, it shall conform with the requirements in ISO 4892-1 and ISO 9370.