ISO/DTS 4767

ISO-/TC- 61/SC- 6/~~WG 2~~

Secretariat:- DIN

Date: 2023-09-20

Plastics — Method of exposure to electrodeless plasma radiation sources

~~DTS~~FDIS stage

~~https://www.iso.org/iso/model_document-rice_model.pdf~~

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Contents

Foreword

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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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Introduction

The International Organization for Standardization (ISO) draws attention to the fact that it is claimed that compliance with this document may involve the use of a patent concerning the laboratory radiation source described in 5.1.

ISO takes no position concerning the evidence, validity, and scope of this patent right.

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Plastics ~~–~~ — Method of exposure to electrodeless plasma radiation sources

~~2~~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.

~~3~~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*

~~4~~3 Terms and definitions

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~~https://www.iso.org/obp

— IEC Electropedia: available at ~~http://www.electropedia.org/~~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

~~5~~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.

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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.

65 Apparatus

6.15.1 Laboratory radiation source

6.1.15.1.1 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. Table 1.

6.1.25.1.2 Spectral irradiance of electrodeless plasma lamps

Table 1Table 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]). [1]).

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

Spectral passband wavelength nm	Minimum %	CIE 241, CIE-H1 %	Maximum %
λ < 290	–	0	0,04
290 ≤ λ ≤ 320	3,2	5,9	8,0
320 < λ ≤ 360	31,3	40,4	35,5
360 < λ ≤ 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.Annex A, Figure A.1.

6.1.35.1.3 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.

6.25.2 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 5.1.3,5.1.3, with means for controlling the temperature.