INTERNATIONAL STANDARD

ISO 16474-3

Second edition
2021-01

Paints and varnishes — Methods of exposure to laboratory light sources —

Part 3: Fluorescent UV lamps

Peintures et vernis — Méthodes d'exposition à des sources lumineuses de laboratoire —

Partie 3: Lampes fluorescentes UV

Reference number
ISO 16474-3:2021(E)

© ISO 2021



COPYRIGHT PROTECTED DOCUMENT

© ISO 2021

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword ... **iv**
Introduction ... **v**
1 Scope ... **1**
2 Normative references ... **1**
3 Terms and definitions ... **1**
4 Principle ... **2**
5 Apparatus ... **3**
5.1 Laboratory light source ... 3
5.2 Test chamber ... 6
5.3 Radiometer ... 6
5.4 Black-standard/black-panel thermometer ... 6
5.5 Wetting and humidity ... 7
5.5.1 General ... 7
5.5.2 Spray and condensation system ... 7
5.6 Specimen holders ... 7
5.7 Apparatus to assess changes in properties ... 7
6 Test specimens (panels) ... **7**
6.1 General ... 7
6.2 Preparation and coating ... 8
6.3 Drying and conditioning ... 8
6.4 Thickness of coating ... 8
6.5 Number of test panels ... 8
7 Test conditions ... **8**
7.1 General ... 8
7.2 Radiation ... 8
7.3 Temperature ... 8
7.4 Relative humidity of chamber air ... 9
7.5 Condensation and spray cycles ... 9
7.6 Complex cycles with dark periods ... 9
7.7 Sets of exposure conditions ... 9
8 Procedure and mounting of the test specimens ... **10**
8.1 General ... 10
8.2 Exposure ... 10
8.3 Measurement of radiant exposure ... 11
8.4 Determination of changes in properties after exposure ... 11
9 Test report ... **11**
Annex A (informative) **Spectral distribution of radiation for typical fluorescent UV lamps** ... **12**
Bibliography ... **16**

© ISO 2021 – All rights reserved

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 35, *Paints and varnishes*, Subcommittee SC 9, *General test methods for paints and varnishes*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 139, *Paints and varnishes,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 16474-3:2013) which has been technically revised. The main changes compared to the previous edition are as follows:

— in 7.2 the difference between the temperature of a black panel sensor and a black standard sensor has been corrected;

— in Table 4 it has been changed that the black-panel temperature is not controlled during water spray;

— the text has been editorially revised and the normative references have been updated.

A list of all parts in the ISO 16474 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

© ISO 2021 – All rights reserved

Introduction

Coatings of paints, varnishes and similar materials (subsequently referred to simply as coatings) are exposed to laboratory light sources, in order to simulate in the laboratory the ageing processes which occur during natural weathering or behind window glass.

© ISO 2021 – All rights reserved

Paints and varnishes — Methods of exposure to laboratory light sources —

Part 3: Fluorescent UV lamps

1 Scope

This document specifies methods for exposing coatings to fluorescent UV lamps, heat and water in apparatus designed to reproduce the weathering effects that occur when materials are exposed in actual end-use environments to daylight, or to daylight through window glass.

The coatings are exposed to different types of fluorescent UV lamps under controlled environmental conditions (temperature, humidity and/or water). Different types of fluorescent UV lamp can be used to meet all the requirements for testing different materials.

Specimen preparation and evaluation of the results are covered in other ISO documents for specific materials.

General guidance is given in ISO 16474-1.

NOTE Fluorescent UV lamp exposures for plastics are described in ISO 4892-3.

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 1514, *Paints and varnishes — Standard panels for testing*

ISO 2808, *Paints and varnishes — Determination of film thickness*

ISO 4618, *Paints and varnishes — Terms and definitions*

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

ISO 16474-1:2013, *Paints and varnishes — Methods of exposure to laboratory light sources — Part 1: General guidance*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4618 and the following apply.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

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

© ISO 2021 – All rights reserved

3.1
radiant exposure
H
amount of radiant energy to which a test panel has been exposed

Note 1 to entry: Radiant exposure is given by the equation:

$$H = \int E \cdot \mathrm{d}t$$

where

H is the radiant exposure, in joules per square metre (J/m^2);

E is the irradiance, in watts per square metre (W/m^2);

t is the exposure time, in seconds (s).

Note 2 to entry: If the irradiance E is constant throughout the whole exposure time, the radiant exposure H is given simply by the product of E and t.

4 Principle

4.1 Fluorescent UV lamps, when properly maintained, can be used to simulate the spectral irradiance of daylight in the ultraviolet (UV) region of the spectrum.

4.2 Specimens are exposed to various levels of UV radiation, heat and moisture (see 4.4) under controlled environmental conditions.

4.3 The exposure conditions may be varied by selection of:

a) the type of fluorescent lamp (spectral power distribution);

b) the irradiance level;

c) the temperature during the UV exposure;

d) the relative humidity of the chamber air during the light and dark exposures, when test conditions requiring control of humidity are used;

NOTE Commercial fluorescent UV lamp devices generally do not provide means of relative humidity control.

e) the type of wetting (see 4.4);

f) the wetting temperature and cycle;

g) the timing of the UV/dark cycle.

4.4 Wetting is usually produced by condensation of water vapour onto the exposed specimen surface or by spraying the test specimens with demineralized/deionized water.

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

4.6 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.

© ISO 2021 – All rights reserved