PD ISO/TS 18950:2021



BSI Standards Publication

Imaging materials — Photographic prints — Effect of light sources on degradation under museum conditions

bsi.

National foreword

This Published Document is the UK implementation of ISO/TS 18950:2021.

The UK participation in its preparation was entrusted to Technical Committee CPW/42, Photography.

A list of organizations represented on this committee can be obtained on request to its committee manager.

Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

© The British Standards Institution 2021
Published by BSI Standards Limited 2021

ISBN 978 0 539 01790 8

ICS 37.040.20

Compliance with a Published Document cannot confer immunity from legal obligations.

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 30 November 2021.

Amendments/corrigenda issued since publication

Date	Text affected

PD ISO/TS 18950:2021

TECHNICAL SPECIFICATION

ISO/TS 18950

First edition
2021-11-08

Imaging materials — Photographic prints — Effect of light sources on degradation under museum conditions

Matériaux pour l'image — Épreuves photographiques — Effet des sources de lumière sur la dégradation dans des conditions de musée

Reference number
ISO/TS 18950:2021(E)

© ISO 2021



COPYRIGHT PROTECTED DOCUMENT

© ISO 2021, Published in Switzerland

All rights reserved. Unless otherwise specified, 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
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

© ISO 2021 – All rights reserved

Contents

Page

Foreword ... **iv**
Introduction ... **v**
1 Scope ... **1**
2 Normative references ... **1**
3 Terms, definitions, and abbreviated terms ... **1**
4 Use profile ... **2**
4.1 General ... 2
4.2 Stress factors in museum use profile ... 2
5 Test method ... **3**
5.1 General ... 3
5.2 Sample specimen preparation ... 3
5.2.1 Outline ... 3
5.2.2 Contemporary materials ... 4
5.2.3 Historic materials ... 4
5.2.4 Selection of suitable test patches on historic materials ... 4
5.2.5 Reference sample specimens ... 5
5.2.6 Backing of the specimens ... 5
5.2.7 Dummy sample ... 5
5.3 Light exposure ... 5
5.3.1 Outline ... 5
5.3.2 Light intensity tolerances and long-term drift ... 6
5.3.3 Specifications for filtered Xenon arc lamp to simulate indoor daylight ... 6
5.3.4 Specifications for incandescent light ... 7
5.3.5 Specifications for LED light ... 7
5.4 Specifications for additional filters ... 8
5.4.1 General ... 8
5.4.2 UV Filter specifications for museum lighting ... 8
6 Measurement ... **9**
6.1 General ... 9
6.2 Measurement conditions ... 9
6.3 Calculation of colour difference ... 9
6.4 Test procedure ... 9
7 Evaluation ... **10**
7.1 General ... 10
7.2 Comparing light sources ... 10
8 Test report ... **10**
Annex A (informative) **Translation of the test results into safe display duration** ... **12**
Annex B (informative) **Examples of a relative spectral irradiance of white LEDs** ... **14**
Bibliography ... **15**

© 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 42, *Photography*.

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

One of the typical uses of prints in museums is their display in a permanent or temporary exhibition under ambient light or artificial illumination. In general, prints may fade due to various environmental stresses, such as light, heat, humidity, pollutants, or biological attack, and the combination of these factors. A museum can fully or partially control and suppress most of those factors. However, light is necessary for display and will cause some degradation over time[1].

This document will provide guidance on how to assess light exposure-related damage to analogue and digital photographic prints under museum display conditions for particular print materials sets. The choice of the light source with the lowest damage potential depends on the specific material types in the mix and the spectral irradiance of the light source.

The document can be of benefit to curators, conservators and lighting designers to select the display lighting with the lowest possible damage potential to an exhibition. It can serve the manufacturers for lighting materials to develop particular solutions for the museum.

Depending on the use case, material type and conditions, a two-tier evaluation may be possible.

Tier I evaluation is useful for comparison of different light sources, namely, to identify the light source that will result in smallest image fading (ΔE) under a given exposure level (lx-h).

Tier II evaluation is useful to estimate appropriate illumination levels (lx) to reach intended display duration, if the following conditions are met (see Annex A for detailed discussion):

a) the museum is able to display the work with a light source having the same relative spectral irradiance (RSI) as the one used for the testing, and

b) a set of representative test samples is available that have the same types of colourant and substrate material as the display work, and

c) the assumption of linearity of image fading in response to different levels of light intensities (reciprocity) is verified, for which test results under different combinations of illumination intensity (lx) and duration (hours) are compared.

A test method of light stability for simulated daylight in indoor display is described in ISO 18937. Future ISO 18937-1 is a description of a general test method and future ISO 18937-2 is a test method with xenon light but which does not cover the particular museum display use case. Therefore, the covered range of environmental conditions and wavelength of light is broader than what is required for this document. It would be difficult to translate the test results following ISO 18937-1 into a specification for museum print display requiring practically no degradation.

This document follows the recommendations of ISO/TS 21139-1:2019, Clause 4 [2] for the definition of a museum use profile and specifications, although the museums use case is not in the scope of ISO/TS 21139-1.

© ISO 2021 – All rights reserved

TECHNICAL SPECIFICATION **ISO/TS 18950:2021**

Imaging materials — Photographic prints — Effect of light sources on degradation under museum conditions

1 Scope

The test method in this document is intended to be used to characterize and compare the degradation of a set of print materials under exposure to particular light sources, eventually including optical filter combinations, under museum environmental conditions. The document covers typical types of indoor light sources commonly found in a museum including indoor daylight, LED, and incandescent light.

This document is applicable to analogue and digital reflection photographic prints.

NOTE Examples of photographic prints covered by this document are prints made with digital printing technologies such as inkjet, electrophotography, and thermal dye transfer, as well as prints made on silver halide colour paper but not prints made on black and white silver halide paper.

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 18913, *Imaging materials — Permanence — Vocabulary*

ISO 18937:2020, *Imaging materials — Photographic reflection prints — Methods for measuring indoor light stability*

ISO 18944, *Imaging materials — Reflection colour photographic prints — Test print construction and measurement*

3 Terms, definitions, and abbreviated terms

For the purposes of this document, the terms and definitions given in ISO 18913 and the following abbreviations apply.

ISO and IEC maintain terminological 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

NOTE SAA also maintain a terminological database:

— SAA online glossary available at https://www2.archivists.org/glossary

3.1
Mlx-h
abbreviated from Mega lux hour, a unit of light exposure, product of illuminance and time

3.2
spectral irradiance
SI
spectral power distribution
SPD
power per unit area per unit wavelength of an illumination

© ISO 2021 – All rights reserved