



DPC: 25/30483296 DC

BSI Group Headquarters

389 Chiswick High Road London W4 4AL

Tel: +44 (0)20 8996 9000

Fax: +44 (0)20 8996 7400

www.bsigroup.com

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



DRAFT International Standard

ISO/DIS 21139-22

Permanence and durability of commercial prints —

Part 22: Backlit display in indoor or shaded outdoor conditions — Light stability

Permanence et durabilité des impressions commerciales —

*Partie 22: Écran rétroéclairé en intérieur ou en extérieur
ombragé — Stabilité de la lumière*

ICS: 37.040.20

ISO/TC 42

Secretariat: **ANSI**

Voting begins on:
2025-02-21

Voting terminates on:
2025-05-16

This document is circulated as received from the committee secretariat.

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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

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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).

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, and represents a revision of ISO/TS 21139-22:2023, which on this occasion is further developed in to an international standard.

A list of all parts in the ISO 21139 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.

Introduction

Backlit display of prints is a market segment in the context of commerce (advertisement, brand shops) and information (maps, directories). This use profile has specific spectral irradiance and environmental conditions which are different from e.g. general indoor or in-window display (ISO/TS 21139-21).

Backlit display applies with prints on transparent or translucent foils and/or prints on a textile. This document focusses on LED-based backlit units and also provides information on fluorescent-based backlit units for reference. These backlit displays may be installed indoor or in shaded outdoor conditions, for examples backlit display units in shelters and patios. Backlit displays which are subject to solar radiative heating or precipitation, introducing extensive temperature cycling, are excluded.

Prints on backlit display may fade or otherwise change in appearance due to various environmental stresses, including light, heat, humidity, atmospheric pollutants, or biological attack, and the combination of these factors. One of the most critical degradations is light fading caused by intense irradiation from the backlit unit as well as illumination from the viewing environment, which may represent various levels of intensity and degrees of spectral irradiance, depending on the installation site in a building, near to a window or in a shaded outdoor condition. The factors determining the exposure doses from either frontside or backside are introduced, and the severity of the actual spectral irradiance is expressed as a ratio to the standardized exposure condition "general indoor" as defined by ISO 18937-2.

The lighting design of the backlit display unit may cause inhomogeneity of the backside exposure of the print, which may in turn introduce inhomogeneous patterns of colour fading or discoloration leading to enhanced visibility of degradation (an example is illustrated in [Annex B](#)). The test method described in this document does not include the assessment of the impact from inhomogeneity of the backside exposure.

This document provides information about the test conditions for colour fading and discoloration applicable for the different types of display materials, including transparent films or translucent films, papers and fabrics. Furthermore, this document gives guidance for estimation of an equivalent exposure dose for the intended time of display, acknowledging the limitations of such generic extrapolations. The display use profile applies for digital and analogue prints.

This test method does not address the adverse effects of exposure to atmospheric pollutants, including ozone, and is also limited to the evaluation of colour changes and therefore does not require specific methods for the evaluation of physical properties, including changes of tensile strength, cockling etc. In the case that backlit materials are constructed from laminates, the aforementioned factors are of less importance.

The general concepts for the exposure characterization of prints on a backlit display provided in this document may also be considered in museum context with details defined by ISO/TS 18950.

Permanence and durability of commercial prints —

Part 22:

Backlit display in indoor or shaded outdoor conditions — Light stability

1 Scope

This document describes the test methods for light stability measurements of prints on transparent or translucent foils, sheets and paper or printed on a textile, which are displayed on backlit units installed in indoor or in shaded outdoor conditions, which are protected against direct precipitation and radiative heating. Installations of backlit display units in outdoor areas without shading, which are exposed to direct weathering and/or radiative heating, are excluded.

This document is applicable to the various product classes of “commercial prints” that are suitable for backlit display. These commercial prints often contain combinations of text, pictorial images and/or artwork.

This document provides guidelines for colour measurements, data analysis and also provides guidance for translation of test results into suitable image permanence performance claims considering the variability of backlit designs and environmental conditions.

This document is applicable to both analogue and digitally printed matter. Methods and principles apply to both colour and monochrome prints.

NOTE This test method does not address the specific requirements for testing museum backlit display, including photographic prints on transparent films. However, museum professionals could adopt the method considering the use of appropriate light sources and/or UV filters (see [Annex A](#)) and the approach of light stability testing in museum context as explained in ISO/TS 18950.

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/CIE 11664-1, *Colorimetry — Part 1: CIE standard colorimetric observers*

ISO/CIE 11664-2, *Colorimetry — Part 2: CIE standard illuminants*

ISO/CIE 11664-4, *Colorimetry — Part 4: CIE 1976 $L^*a^*b^*$ colour space*

ISO 18913:2021, *Imaging materials — Permanence — Vocabulary*

ISO 18937-1, *Imaging materials — Methods for measuring indoor light stability of photographic prints — Part 1: General guidance and requirements*

ISO 18937-2, *Imaging materials — Methods for measuring indoor light stability of photographic prints — Part 2: Xenon-arc lamp exposure*

ISO/PAS 18940-1, *Imaging materials — Image permanence specification of reflection photographic prints for indoor applications — Part 1: Test methods*

ISO/TS 21139-1, *Permanence and durability of commercial prints — Part 1: Definition of use profiles and guiding principles for specifications*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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 <https://www.electropedia.org/>

3.1 Symbols and abbreviated terms

CCT	correlated colour temperature - see International Electrotechnical Vocabulary (IEV) ref: 845-23-068
CIE	Commission internationale de l'éclairage (International Commission on Illumination)
RSD	relative spectral distribution,
GI	RSD of the test condition "General Indoor" – see ISO 18937-2
ΔE_{ab}	colour difference defined in ISO/CIE 11664-4 ^[2]
$\Delta E_{ab,ave}$	average of the colour differences of the patches of the test target (vs. initial)
$\Delta E_{ab,max}$	maximum of the colour differences of the patches of the test target (vs. initial)
ΔE_{00}	colour difference ΔE_{2000} as defined in ISO/CIE 11664-6 ^[3]
E_v	illuminance
τ	duty cycle
H_v	luminous energy
$\tilde{H}_{\Delta E_{ab}}$	severity weighted dose at which a certain colour change ΔE_{ab} is observed

3.2 measures of exposure severity

3.2.1

relative spectral distribution

$S(\lambda)$

quotient of the spectral distribution of a radiant, luminous or photon quantity and a fixed reference value

Note 1 to entry: shortened from International Electrotechnical Vocabulary (IEV) ref 845-21-030

3.2.2

relative severity

ρ_s/s_{ref}

ratio of the expected density loss due to light fading for exposure under a given relative spectral distribution $S(\lambda)$ in comparison to a reference $S_{ref}(\lambda)$ with both exposures at the same level of illuminance E_v , as evaluated based by an average action spectrum model (see [Annex A](#)).

Note 1 to entry: For typical relative spectral distributions $S(\lambda)$ the degree of light fading obtained for the same amount of luminous energy has been expressed in relative units to each other based on experimental data and an action spectrum model obtained for typical CMY colorants used in digital printing, see [Annex A](#).

Note 2 to entry: Standardized relative spectral distributions $S(\lambda)$ include daylight filtered Xenon-arc (see ISO 18930), window-glass filtered Xenon-arc for simulated in-window display or with additional UV blocking for general indoor display (see ISO 18937-2), fluorescent light (see ISO 18909) and LED light (see ISO 18937-3).