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Informatika in dokumentacija - Trajnost in obstojnost pisanja, tiskanja in razmnoževanje na papir - Zahteve in preskusne metode

Information and documentation — Permanence and durability of writing, printing and copying on paper — Requirements and test methods

Information et documentation — Permanence et durabilité de l'écriture, de l'impression et de la reprographie sur des documents papier — Prescriptions et méthodes d'essai

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Information and documentation — Permanence and durability of writing, printing and copying on paper — Requirements and test methods

Information et documentation — Permanence et durabilité de l'écriture, de l'impression et de la reprographie sur des documents papier — Prescriptions et méthodes d'essai

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Foreword

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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 document 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 46, *Information and documentation*, Subcommittee SC 10, *Requirements for document storage and conditions for preservation*.

This second edition cancels and replaces the first edition (ISO 11798:1999), which has been technically revised.

The main changes are as follows.

— The reference material used for the testing of mechanical properties is defined and shall, prior to testing, be handled according to 4.5.

— CIELAB measurements replaces optical density measurements, i.e. evaluation of monocoloured printing shall be performed by CIELAB measurements. Accordingly, microdensitometers or densitometers are no longer needed.

— Testing of colour fastness (5.2 and 6.2) shall be followed to evaluate recording (monocoloured and multicoloured) for lightfastness (6.4), water resistance (6.5) and resistance to heat (6.8).

— Table 1 (see 5.1) presents, for printing devices, elaborated CIELAB lightness and colour shift requirements ΔL^*, Δa^*, Δb^* and, in addition, a new requirement of ΔE^*_{ab} (Euclidean distance between two CIELAB coordinates).

— Table 2 (see 5.1) presents, for pens and stamps, requirement of maximum CIELAB lightness change ΔL^*.

— Abrasion resistance (formerly referred to as *resistance to wear*) shall be evaluated by the degree of abrasion (6.7) and is determined by CIELAB measurements prior to, and after, abrasion.

— Detailed descriptions of specimen preparation for pens and stamps, three printout templates for specimen preparation from printers and copying machines and reporting forms are given in Annexes.

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

It is of great importance that recording of images on paper which, during long-term storage in libraries, archives, and other protected environments, undergo little or no change in properties that affects its use. The documents must preserve their information content and, thus, enable information storage and information supply for the future. Accordingly, it is important to study the permanence and durability of recording on paper.

Writing materials and printing equipment meeting the requirements given in this document can be used in the preparation of paper documents intended for long-term storage and recurrent use. Such documents contain permanent and durable images, i.e. images likely to be stable and thus undergo little or no change in properties that influence legibility and the possibility of copying or converting the paper documents to other data carriers.

Permanent paper and archival paper, used in the preparation of documents, may differ widely in properties of importance for the quality and permanence of the image. Some properties of an image, such as abrasion resistance, depend on the combination of the image and the paper. The testing conditions of this document are chosen so that results, representative of most papers on the market to be used for a particular imaging process, shall be obtained.

In this document, the requirements are given in the following attributes:

— visual image colour strength and appearance;

— lightfastness;

— water resistance;

— transfer of recorded image;

— abrasion resistance;

— resistance to heat;

— effect of recording on the mechanical strength of the paper.

Experience has shown that images written with carbon black ink as well as printed images using commercial printing inks have proved to be consistently reliable. There are, however, many documents where acidic inks have affected the paper to such an extent that the paper has degraded. Images produced from dry or liquid toner are also susceptible to ageing problems.

Images printed with modern material and machinery are often completely different from old images with respect to composition and properties. The rapid development of new printing techniques makes this testing very important. One printing technology may be replaced by a newer technology within a few years on the market. Therefore, conclusions based on studies of old documents in libraries and archives are of limited use when discussing the permanence of modern documents.

Strictly speaking, the only way to test the permanence and durability of documents is to handle them and to store them under the relevant conditions for long periods of time. In practice, one can only rely on the observations made on documents kept for a few decades and evaluate the effect of factors known to influence the permanence and durability of the image. Therefore, the testing according to this document does not correlate to lifetime of documents, but rather the documents that satisfy the requirements can be stored for a long time in the future in archives and protected environments, probably for several hundred years.

Information and documentation — Permanence and durability of writing, printing and copying on paper — Requirements and test methods

1 Scope

This document specifies requirements and test methods for evaluation of the permanence and durability of writing, printing and copying on paper stored in libraries, archives, and other protected environments for long periods of time, in which the information recorded on paper must be retained but not necessarily the full artistic quality.

It is applicable to:

— images on white permanent paper according to ISO 9706 or ISO 11108;

— recording obtained from pens, stamps, copying machines and printers (that can produce monocoloured and/or multicoloured images).

It does not apply to:

— documents stored under harmful conditions, such as high humidity that promotes microbiological attack, excessive heat, radiation (e.g. light), high levels of pollutants, or the risk of water damage (or water contact). Since documents might be kept in non-protected environments before being transferred to protected environments, resistance to water and light is, however, of importance;

— legal documents, e.g. banking documents, where the authenticity is of primary interest;

— documents where the information contents are influenced by small colour changes;

— documents within the scope of ISO/TC 42, *Photography*.

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 536, *Paper and board — Determination of grammage*

ISO 1924-2, *Paper and board — Determination of tensile properties — Part 2: Constant rate of elongation method (20 mm/min)*

ISO 2470-1, *Paper, board and pulps — Measurement of diffuse blue reflectance factor — Part 1: Indoor daylight conditions (ISO brightness)*

ISO 4892-2, *Plastics — Methods of exposure to laboratory light sources — Part 2: Xenon-arc lamps*

ISO 5626, *Paper — Determination of folding endurance*

ISO 9352, *Plastics — Determination of resistance to wear by abrasive wheels*

ISO 9706, *Information and documentation — Paper for documents — Requirements for permanence*

ISO 11108, *Information and documentation — Archival paper — Requirements for permanence and durability*

ISO 12757-1, *Ball point pens and refills — Part 1: General use*

ISO 13655, *Graphic technology — Spectral measurement and colorimetric computation for graphic arts images*

ISO 14145-1, *Roller ball pens and refills — Part 1: General use*

ISO 27668-1, *Gel ink ball pens and refills — Part 1: General use*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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
abrasion resistance
rub resistance
characteristic of a document with *recording* (3.14) against losses of image or text from the action of abrasion (i.e. the ability of materials and structures to withstand mechanical wear or rubbing by means of friction)

Note 1 to entry: Abrasion resistance is measured in this standard as the *degree of abrasion resistance,* R_a (3.4).

3.2
archival paper
paper of high *permanence* (3.11) and high *durability* (3.6)

[SOURCE: ISO 11108:1996, 3.1]

3.3
CIELAB colour shift
lightness and colour change (ΔL^*, Δa^*, Δb^* and ΔE^*_{ab}) measured between two coordinates in the CIELAB colour space

Note 1 to entry: CIELAB colour space is a three-dimensional, approximately uniform colour space, produced by plotting, in rectangular coordinates L*, a*, b*. It was defined by the International Commission on Illumination (CIE) in 1976 (Synonymously referred to as CIE 1976 L*a*b*. CIELAB colour space or CIELAB values.).

Note 2 to entry: The quantity L* is a measure of the lightness, where L* = 0 corresponds to black and L* = 100 corresponds to the perfect reflecting diffuser. Visually, the quantities a* and b* represent respectively the red-green and yellow-blue axes in colour space, such that:

— +a* is a measure of the degree of redness;

— −a* is a measure of the degree of greenness;

— +b* is a measure of the degree of yellowness;

— −b* is a measure of the degree of blueness.

If both a* and b* are equal to zero, the test piece is grey

Note 3 to entry: Synonymously referred to as CIE 1976 *L*a*b**, CIELAB colour space or CIELAB values.

Note 4 to entry: Adapted from ISO/TS 21331:2020, 3.3.5.

3.4
degree of abrasion resistance
R_a
measure of the magnitude of retain of recorded image (or text) on paper because of abrasion (or wear, or rubbing)

Note 1 to entry: Degree of abrasion resistance is evaluated by measuring the % of changes in *L** of a printed image or text prior to and after the abrasion test, according to ISO 13655, and is calculated according to Formula (5) in 6.7.

3.5
document
recorded information which can be treated as a unit in a documentation process

[SOURCE: ISO 5127:2017, 3.1.1.38, modified — "material object" and Notes to entry have been deleted from the definition.]

3.6
durability
ability to resist the effect of physical stress, such as wear and tear, pressure, or damage during recurrent use

3.7
image
visual representation with colourants (such as dyes or pigments) distributed on paper as text characters, lines, colour patches or other visually identifiable patterns

3.8
monochromatic image
image (3.7) with *recording* (3.14) uniformly in one colour

Note 1 to entry: Images produced in one colour from a black and white printer, or any colour from a printer that can produce other colours, such as black, cyan, magenta and yellow.

3.9
multicoloured image
image (3.7) composed of *recording* (3.14) in more than one colour, where the colours constitute part of the information contents

Note 1 to entry: It can be separated into different base colours (e.g. black, cyan magenta and yellow).

Note 2 to entry: Not to be confused with a coloured image. A coloured image is in this standard referred to as an image recorded in any colour as a *monochromatic image* (3.8).

3.10
performance testing paper
permanent paper (3.13) or *archival paper* (3.2) used for sample preparation

Note 1 to entry: The performance testing paper shall be handled according to clause 4.1 and meet the requirements of Annex A.

3.11
permanence
ability to remain chemically and physically stable over long periods of time

3.12
permanent image
image (3.7) which, during long-term storage in libraries, archives and other protected environments will undergo little or no change in properties that affect its use