International Standard

ISO 11798

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

Third edition
2026-11

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Reference number
ISO 11798:2026(en)

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Published in Switzerland

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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*.

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This third edition cancels and replaces the second edition (ISO 11798:2023), which has been technically revised.

The main changes are as follows.

— The abrasion resistance requirements have been developed and improved.

— The status of Annex C has been changed from normative to informative.

— The temperature and humidity tolerances for sample preparation and testing have been clarified in several clauses.

— The UV-light dose value in 6.4 has been corrected from 0,108 J/m^2 to 10,8 MJ/m^2.

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.

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Introduction

For specific archival documents, it is of great importance that writing, printing and copying (recording) on paper which, during long-term storage in libraries, archives, and other protected environments, undergo little or no change in properties that affects their 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 information carriers.

This document specifies requirements and testing methods for evaluation of the permanence and durability of recording on paper. It is primarily intended for images on writing, printing and photo-copying papers according to ISO 9706 [1] (permanent paper) or ISO 11108 [2] (archival paper).

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 recording;

— abrasion resistance;

— resistance to heat;

— effect of recording, or the recording process, on the mechanical strength of the paper.

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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 recording on paper is to handle documents and 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.

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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 [1] or ISO 11108 [2];

— 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 shifts;

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

— permanence and durability of books, but if permanent or archival paper is used in combination with recording that meets the requirements of this document, the book content will most likely become permanent; however, book bindings and covers are not included.

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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*

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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* (3.7) 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 document as the *degree of abrasion resistance* (3.4).

3.2
archival paper
paper of high *permanence* (3.11) and high *durability* (3.6) in accordance with ISO 11108

3.3
CIELAB lightness and colour shift
lightness difference (ΔL^*) and colour differences (Δa^* and Δb^*) 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 white, grey or black depending on L*.

Note 3 to entry: Adapted from ISO 5631-2:2022 [3], 3.6.

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3.4
degree of abrasion resistance
R_a
measure of the magnitude of retain of *images* (3.7), 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, measured in accordance with ISO 13655 [4], and is calculated in accordance with Formula (6) in 6.7.2.

3.5
document
information on paper obtained from a *recording* (3.14) process which can be treated as a unit in a documentation process

[SOURCE: ISO 5127:2017 [5], 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) created with a *recording* (3.14) process 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.

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

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

Note 2 to entry: Not to be confused with a coloured image. In this document, a coloured image is referred to as an image 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 in accordance with 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) that, when stored over long periods in libraries, archives, or other controlled environments, exhibits minimal or no alteration in characteristics that influence its usability

3.13
permanent paper
paper of high *permanence* (3.11) in accordance with ISO 9706 [1]

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