INTERNATIONAL STANDARD

ISO 9706

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Information and documentation — Paper for documents — Requirements for permanence

Information et documentation — Papier pour documents — Prescriptions pour la permanence

Reference number
ISO 9706:1994(E)

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 9706 was prepared by Technical Committee ISO/TC 46, *Information and documentation*, Subcommittee SC 10, *Physical keeping of documents*.

ISO 9706 was developed on the basis of the standard ANSI Z39.48:1984, *American National Standard for Information Sciences — Permanence of Paper for Printed Library Materials*. That standard was revised in 1992, and the technical requirements of this International Standard are in conformity with the standard ANSI/NISO Z39.48:1992, *American National Standard for Permanence of Paper for Publications and Documents in Libraries and Archives*. The limiting values of two of the four required characteristics, viz. tear resistance and resistance to oxidation, differ slightly. A symbol of compliance in the form of the mathematical symbol denoting infinity set inside a circle was developed by NISO, the US National Information Standards Organization and introduced in ANSI Z39.48:1984. The NISO symbol is now part of ANSI/NISO Z39.48:1992. The symbol is used in this International Standard with the permission of NISO.

Annexes A and B form an integral part of this International Standard. Annex C is for information only.

International Organization for Standardization
Case Postale 56 • CH-1211 Genève 20 • Switzerland

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Introduction

Librarians and archivists have found that paper documents made as recently as 50 years ago are beginning to show serious deterioration under typical library and archive storage conditions. The history of the past 1 500 years shows that fibres of pure cellulose have considerable permanence. Modern research indicates that the deterioration is due to the presence of cellulose-degrading compounds in the paper furnish and materials incorporated in the paper during manufacture, e.g. acidic materials such as rosin-alum size.

The purpose of this International Standard is to provide a means of specifying and identifying paper that, according to the present state of knowledge, has a high degree of permanence and is likely to undergo little or no change in properties that influence readability and handling when stored in a protected environment for long periods of time. Standardization of document storage requirements is in progress within ISO/TC 46/SC 10/WG 3 (at present ISO WD 11799, documents ISO 46/10/3 N 1 to 5).

This International Standard is based on a limited number of quantitative tests. For each test, limiting values have been laid down. A paper, to be classified in accordance with this International Standard as being suitable for long life documents, records and publications must show test values within the limits given for all the tests prescribed.

The limiting values have been selected so that bulk quantities of paper classified by this International Standard can be produced at reasonable cost. This will allow book printers, publishers, offices, and others to use the paper for all types of documents, records or publications which for some reason are likely to be stored in libraries or archives for a prolonged period.

Papers for sale that comply with the requirements in this International Standard and documents produced on such papers may be identified by a symbol and a statement of compliance. This symbol and statement is described in annex B.

The rationale for exclusion of some commonly used paper tests is given in annex C.

This International Standard can be used as a specification as it stands. It can also be incorporated as an element in other specifications, used in trade, or in other national or International Standards for more specialized purposes.

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Information and documentation — Paper for documents — Requirements for permanence

1 Scope

This International Standard specifies the requirements for permanent paper intended for documents. It is applicable to unprinted papers. It is not applicable to boards.

NOTE 1 The terms *paper* and *board* are defined in ISO 4046.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 186:1985, *Paper and board — Sampling to determine average quality.*

ISO 187:1990, *Paper, board and pulps — Standard atmosphere for conditioning and testing and procedure for monitoring the atmosphere and conditioning of samples.*

ISO 302:1981, *Pulps — Determination of Kappa number.*

ISO 536:1976, *Paper and board — Determination of grammage.*

ISO 1974:1990, *Paper — Determination of tearing resistance (Elmendorf method).*

ISO 4046:1978, *Paper, board, pulp and related terms — Vocabulary.*

ISO 5127-1:1983, *Documentation and information — Vocabulary — Part 1: Basic concepts.*

ISO 6588:1981, *Paper, board and pulps — Determination of pH of aqueous extracts.*

ISO 10716:—[1], *Paper and board — Determination of alkali reserve.*

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 document: Paper upon which information is recorded (see also ISO 5127-1).

3.2 permanence: The ability to remain chemically and physically stable over long periods of time.

3.3 permanent paper: Paper which during long term storage in libraries, archives and other protected environments will undergo little or no change in properties that affect use.

NOTE 2 Examples of use of a document include, but are not limited to, the ability of the document to be handled, read, examined, or copied for the purposes of dissemination or transfer to another medium.

3.4 alkali reserve (of a paper)**:** A compound (such as calcium carbonate) that neutralizes acid that might be generated as a result of natural ageing or from atmospheric pollution, determined as specified in ISO 10716.

1) To be published.

4 Principle

Strictly speaking, the only way to test the permanence of a paper is to store it under the relevant conditions for a long time, perhaps for several hundred years. In practice, one has to rely upon observations made on historical documents and on present knowledge about factors, expressed in terms of paper properties and paper composition, that promote a high degree of permanence.

In this International Standard, the requirements are given in terms of

— minimum strength, measured by a tear test;

— minimum content of substance (such as calcium carbonate) that neutralize acid action, measured by the alkali reserve;

— maximum content of easily oxidized material, measured by the Kappa number;

— maximum and minimum pH values of a cold water extract of the paper.

5 Required characteristics

5.1 General

A sample of the lot under inspection shall be obtained as described in ISO 186. The paper used for testing shall be free from obvious defects, such as large specks, holes and wrinkles. The presence of an intended watermark is not considered a defect.

5.2 Strength properties

For papers of grammage 70 g/m^2 or more, the tearing resistance in any direction (machine and cross) shall be at least 350 mN. For papers of grammage in the range 25 g/m^2 to 70 g/m^2, the tearing resistance, expressed in millinewtons, shall be at least r as calculated from the expression:

$$r = 6g - 70$$

where g is the grammage of the paper [g/m^2], and the constants "6" and "70" are given the dimensions [mN·m^2/g] and [mN] respectively.

The samples shall be conditioned at 23 °C and 50 % relative humidity as described in ISO 187. The tear test shall be performed as described in ISO 1974.

5.3 Alkali reserve

The paper shall have an amount of alkali reserve corresponding to at least 0,4 mol of acid per kilogram, determined as specified in ISO 10716.

NOTE 3 When calcium carbonate is used to create the alkali reserve, the requirement is met if the paper contains about 20 g of $CaCO_3$ per kg of paper.

5.4 Resistance to oxidation

The paper shall have a Kappa number of less than 5, measured as specified in ISO 302 with the modification given in annex A of this International Standard.

5.5 pH value of aqueous extract

The pH value of an aqueous extract, prepared with cold water and determined as specified in ISO 6588, shall be in the range from 7,5 to 10,0.

NOTE 4 This test gives the average pH value of the paper. However, in a permanent paper, no single layer should have a pH value below 7,5. To ensure this, the manufacturer's warrant of the use of an alkaline process may be accepted as indication that the paper meets this requirement.

6 Report

The testing laboratory shall include in its report the following:

a) precise identification of the paper lot tested;

b) date and place of testing;

c) the visual observations made when inspecting the sample;

d) the grammage of the paper, determined as specified in ISO 536;

e) the test results obtained when testing as specified in 5.2 to 5.5, expressed as stated in the relevant ISO Standard;

f) any other observations made that may be of importance for permanence of the paper;

g) a statement that the paper meets or fails to meet the requirements of this International Standard. In the latter case, the specific reason shall be stated.

7 Additional information

This International Standard should be considered as a screening test for general purposes.

According to present knowledge of paper permanence, papers that fulfil the requirements given are likely to undergo little or no change in properties that influence readability and handling in libraries, archives and other protected environments.

This International Standard is primarily intended for writing and printing papers and also reprographic printing papers. Some papers for specialized purposes may fail to fulfil all the requirements although they have a high degree of permanence. This may be the case for some heavily coated printing papers, such as art paper, and also for some papers used by artists.

This International Standard is not intended for judging the permanence of papers stored under hostile conditions, such as high humidity that may promote microbiological attack, excessive heat, radiation (light or other), high levels of atmospheric pollutants, or the influence of water.

Annex A
(normative)

Special instruction for determining the Kappa number

Since the sole purpose of the Kappa number determination is to ascertain whether the Kappa number is less than 5 or not, it is convenient to adjust the size of the sample taken for analysis so that the sensitivity of the test is at a maximum in the range near Kappa number 5. For an oven-dry pulp this sample size is 10 g. For paper, the sample size should equally be 10 g. The determination will then be exact if the paper has a Kappa number in the approximate range 3 to 7, because ISO 302 requires that between 30 % and 70 % of the permanganate added should be consumed. If more than 70 % or less than 30 % of the permanganate is consumed, it is sufficient for the purposes of this International Standard to report the Kappa number as greater than 7 or less than 3 respectively.

NOTE 5 ISO 302 is intended for the testing of pulp. For the purposes of this International Standard, the procedure described in ISO 302 is applied to paper with no modifications. However, with some coated papers containing starch it may be difficult to detect the end point of the titration visually. In such cases, an electrometric end-point detection may be used.

If the Kappa number is determined to be less than 3 or greater than 7, the determination is not exact, although it is valid for the present purpose. If an exact determination in these cases should be asked for, a new determination with an adjusted sample size shall be conducted.

Annex B
(normative)

Statement and symbol of compliance

All makers and users of paper are encouraged to use and promote the use of a symbol and a statement of compliance, for paper certified by a recognized laboratory to meet the requirements of this International Standard.

As the symbol of compliance, the mathematical symbol denoting infinity, set inside a circle and placed above the number of this International Standard shall be used (see figure B.1).

Figure B.1 — Symbol of compliance

As the statement of compliance, the following shall be used:

"The paper/This paper meets the requirements of ISO 9706:1994, *Information and documentation — Paper for documents — Requirements for permanence.*"

The symbol, statement or both should be used in advertising, packaging, promotion, reviews and publication catalogues.

As a guide to publishers and others who choose paper for documents, those papers from which long-life documents, records and publications can be made should be marked with the symbol or statement or both in paper trade catalogues.

The symbol of compliance with its accompanying statement should be positioned according to national practice for the placement of technical information about the document. In addition, either the symbol or statement or both may be used in any other position on the product.

NOTE 6 If a reproduction is made of a printed document containing the symbol and/or statement of compliance, care should be taken to avoid misinformation if the reproduction is not made on paper that complies with this International Standard.