BRITISH STANDARD

BS EN ISO 9706:2000

Incorporating Amendment No. 1 to BS ISO 9706:1994 (renumbers the BS ISO as BS EN ISO 9706:2000)

Information and documentation — Paper for documents — Requirements for permanence

The European Standard EN ISO 9706:1998 has the status of a British Standard

ICS 01.140.20; 85.060

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Paper and Printing Standards Policy Committee (PAM/-) to Technical Committee PAM/11, upon which the following bodies were represented:

British Carton Association
British Fibreboard Packaging Association
British Paper and Board Industry Federation
British Printing Industries' Federation
British Textile Confederation
Envelope Makers' and Manufacturing Stationers' Association
Her Majesty's Stationery Office
Institute of Paper Conservation
Pira International
Post Office
University of Manchester (Institute of Science and Technology)
Coopted member

This British Standard, having been prepared under the direction of the Paper and Printing Standards Policy Committee, was published under the authority of the Standards Committee and comes into effect on 15 August 1994

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National foreword

This British Standard is the English language version of EN ISO 9706:1998, published by the European Committee for Standardization (CEN).

This British Standard is published under the direction of the Paper and Printing Standards Policy Committee whose Technical Committee PAM/11 has the responsibility to:

- aid enquirers to understandard the text;
- present to the responsible international/European committee any enquiries on interpretation, or proposals for change, and keep UK interests informed;
- monitor related international and European developements and promulgate them in the UK.

Cross-references

Attention is drawn to the fact that CEN and CENELEC Standards normally include an annex which lists normative references to international publications with their corresponding European publications. The British Standards which implement these international or European publications may be found in the BSI Standards Catalogue under the section entitled “International Standards Correspondence Index”, or by using the “Find” facility of the BSI Standards Electronic Catalogue.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN ISO title page, the EN ISO foreword page, the ISO title page, pages ii and ii, a blank page, pages 1 to 7 and a back cover.

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EUROPEAN STANDARD
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EUROPÄISCHE NORM

EN ISO 9706

June 1998

ICS 01.140.40; 85.060

Descriptors: documentation, information, documents, paper, paper products, printing papers, writing paper, durability, characteristics, tear strength, kappa number, ph, certification, graphic symbols, specifications, stability

English version

Information and documentation — Paper for documents — Requirements for permanence

(ISO 9706:1994)

Information et documentation — Papier pour documents — Prescriptions pour la permanence (ISO 9706:1994)

Information und Dokumentation — Papier für Schriftgut und Druckerzeugnisse — Voraussetzungen für die Alterungsbeständigkeit (ISO 9706:1994)

This European Standard was approved by CEN on 4 June 1998.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

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Ref. No. EN ISO 9706:1998 E

Foreword

The text of the International Standard from Technical Committee ISO/TC 46, Information and documentation, of the International Organization for Standardization (ISO) has been taken over as a European Standard by Technical Committee CEN/TC 172, Pulp, paper and board, the Secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 1998, and conflicting national standards shall be withdrawn at the latest by December 1998.

According to CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Endorsement notice

The text of the International Standard ISO 9706:1998 has been approved by CEN as a European Standard without any modification.

NOTE Normative references to International Standards are listed in annex ZA (normative).

INTERNATIONAL STANDARD

ISO 9706

First edition
1994-03-01

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.

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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.

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.

Annex C
(informative)

Notes on accelerated ageing tests and optical properties

C.1 Accelerated ageing

It is clearly not practical to measure the useful life of a permanent paper by natural ageing, since paper of the type specified by this International Standard is expected to remain substantially unchanged for several hundred years. Therefore, some form of accelerated ageing procedure is often adopted, usually involving exposure to elevated temperatures at some fixed relative humidty. In drafting this International Standard, much consideration was given to the question of whether or not an accelerated ageing test should be included, with the same status as the other tests. It was concluded that this would not be appropriate, for the following reasons:

a) An ageing test cannot be used as a quality control aid in the manufacture of paper because it takes too long; typically 24 days [see b)]. It can be argued that the test need only be done infrequently, as long as the process is controlled to give positive results in the other tests, but this reduces the status of the ageing test. In any case, customers could still reasonably ask for it to be done, if a producer was claiming to meet this International Standard.

b) Interlaboratory trials conducted whilst drafting this International Standard showed clearly that with regard to mechanical properties, if a paper passed the main set of tests, it would not fail the proposed accelerated ageing test (24 days at 80 °C and 65 % RH in accordance with ISO 5630-3, with the tearing resistance in both machine and cross direction retaining at least 80 % of the original value).

c) Many papers which passed the accelerated ageing test contained substantial proportions of mechanical pulp of different kinds, including modern types such as chemi-thermomechanical pulp (CTMP). In spite of that, such pulps have not been considered to be currently suitable for papers specified by this International Standard due to the lack of scientific certitude. For example, it is not yet demonstrated that oxides of sulfur and nitrogen in the atmosphere will not react more readily with lignified fibres to give acidic residues likely to promote cellulose degradation. This source of degradation is not covered by conventional accelerated ageing tests.

Nevertheless, there is no doubt that accelerated ageing can be a very helpful procedure in the right circumstances, and its possible use should be considered. In particular, it is recommended where specific changes are to be made in the composition of papers intended to meet this International Standard. In this case, papers can be compared side by side, minimizing problems arising from the need to control ageing conditions precisely.

Since a minimum initial tearing resistance is specified in this International Standard, it would in such cases be convenient to use tear strength as an indicator of ageing. Using the ISO 5630-3 conditions mentioned above, a decrease in tearing resistance of not more than 20 % is recommended as the minimum requirement. However, other appropriate mechanical properties might be used, such as folding endurance or tensile energy absorption. Precision is improved if samples are aged for different lengths of time and graphs plotted to show the rate of decrease of the chosen property.

C.2 Optical properties

This International Standard does not include tests to ensure retention of optical properties, such as brightness, Y value, gloss or fluorescence. The reason for this is that in the uses envisaged for the papers (see clause 7), some loss of brightness or slight yellowing is less important than retention of mechanical strength; a certain degree of discoloration can be tolerated before most printed material becomes illegible. It was therefore considered that the added complication of specifying optical tests was unnecessary, especially as accelerated ageing tests would almost certainly be needed, including exposure to light.

If the users find it necessary to be sure that the paper will keep its optical properties, they can agree with the papermaker to define these properties and the way to test and measure them.

Annex ZA (normative)

Normative references to international publications with their relevant European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

Publication	Year	Title	EN	Year
ISO 186	1985	*Paper and board — Sampling to determine average quality.*	EN ISO 186	1996
ISO 187	1990	*Paper, board and pulps — Standard atmosphere for conditioning and testing and procedure for monitoring the atmosphere and conditioning of samples.*	EN 20187	1993
ISO 536	1976	*Paper and board — Determination of grammage.*	EN ISO 536	1996
ISO 1974	1990	*Paper — Determination of tearing resistance (Elmendorf method).*	EN 21974	1994

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