INTERNATIONAL STANDARD

ISO 16245

Second edition
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Information and documentation — Boxes, file covers and other enclosures, made from cellulosic materials, for storage of paper and parchment documents

Information et documentation — Boîtes, sous-chemises et autres contenants en matériaux cellulosiques, pour le stockage des documents sur papier et parchemin

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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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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 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 16245:2009), which has been technically revised.

The main changes are as follows:

— ISO 23404 has been added as a normative reference, and an acceptance limit based on tests carried out in accordance with ISO 23404 has been determined;

— the bleeding test procedure has been improved;

— the different types of boards used for making boxes, file covers and other enclosures have been defined.

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

Boxes, file covers and other enclosures are available in several different materials. Those made of cellulosic materials are the most commonly used enclosures for long-term storage of paper and parchment documents. Experience has shown that properties of the enclosure are of great importance to the protection, permanence and durability of the documents. This document specifies a number of basic requirements relevant to the material composition and construction of cellulose based boxes, file covers and other enclosures.

The purpose of boxes, file covers and other enclosures is to hold and contain documents in prescribed order or grouping, to provide a protective container, and to facilitate identification, transport and storage. Preferably, the same file covers and boxes can be used from storage at the place of work to the final archive storage. Moreover, it is possible to transport, handle and lend a related collection of documents as a unit.

Boxes, through their design and construction, protect documents from environmental risks such as light, rapid temperature and moisture changes and dust, as well as from damage related to handling. File covers and folders further protect documents by enclosing them with materials specified for their preservation qualities. However, even high-quality file covers, folders and boxes cannot compensate for poor storage conditions.

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

Information and documentation — Boxes, file covers and other enclosures, made from cellulosic materials, for storage of paper and parchment documents

1 Scope

This document specifies requirements for boxes, file covers and other enclosures made of cellulosic material, to be used for long term storage of documents on paper or parchment.

This document is applicable to boxes made of solid or corrugated board and to file covers and other enclosures made of paper or board.

This document can also be applicable to other types of enclosures for long term storage such as cases, portfolios, tubes and envelopes made of cellulosic material.

This document is not applicable to storage of photographic materials.

NOTE ISO 18902 contains requirements on storage materials for photographs.

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 5-3, *Photography and graphic technology — Density measurements — Part 3: Spectral conditions*

ISO 5-4, *Photography and graphic technology — Density measurements — Part 4: Geometric conditions for reflection density*

ISO 302, *Pulps — Determination of Kappa number*

ISO 535, *Paper and board — Determination of water absorptiveness — Cobb method*

ISO 536, *Paper and board — Determination of grammage*

ISO 4046-4, *Paper, board, pulps and related terms — Vocabulary — Part 4: Paper and board grades and converted products*

ISO 5626:1993, *Paper — Determination of folding endurance*

ISO 6588-1, *Paper, board and pulps — Determination of pH of aqueous extracts — Part 1: Cold extraction*

ISO 10716, *Paper and board — Determination of alkali reserve*

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

ISO 12048:1994, *Packaging — Complete, filled transport packages — Compression and stacking tests using a compression tester*

ISO 23404, *Information and documentation — Papers and boards used for conservation — Measurement of impact of volatiles on cellulose in paper*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4046-4 and the following 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
box
storage container intended to protect documents and facilitate their shelving and handling

3.2
file cover
enclosure made of a sheet of paper or board used for housing of and as a separating agent for document(s)

3.3
folder
sheet of heavy paper stock or cardboard, scored near the middle, its halves bent so they rest side by side, and used as a loose cover to keep documents and other flat materials together, especially for purposes of filing

[SOURCE: SAA Glossary https://dictionary.archivists.org]

3.4
viscosity-average degree of polymerization
DP_v
average number of anhydroglucose units (monomers of cellulose) in the cellulose macromolecule, determined by measuring the viscosity of solutions in cupri-ethylenediamine (CED)

[SOURCE: ISO/TS 18344:2016, 3.3, modified — "Viscosity" has been added to the term, and the determination process has been added to the definition.]

3.5
loss of DP_v
ωDP_v
arithmetic mean of the DP_v (3.4) of an exposed sample of reference paper against the DP_v of an unexposed sample of same paper

[SOURCE: ISO 23404:2020, 3.7, modified — "Viscosity average degree of polymerization" has been replaced by DP_v]

3.6
alkali reserve
compound, such as calcium carbonate, that neutralizes acid that can be generated as a result of natural aging or from atmospheric pollution

[SOURCE: ISO 9706:1994]

3.7
homogenous single-layer board
board comprising a single furnish layer

Note 1 to entry: This definition is equivalent to a solid board as defined by ISO 4046-4:2016, 4.49.

Note 2 to entry: The term single-ply board can also be used instead of single-layer board.

3.8
two-layer board
board consisting of two furnish layers combined together during manufacture, while still moist

Note 1 to entry: The terms two-ply board and duplex board can also be used instead of two-layer board.

[SOURCE: ISO 4046-4:2016, 4.195]

3.9
three-layer board
board consisting of three furnish layers combined together during manufacture, while still moist

Note 1 to entry: The outer furnish layers may be of the same composition.

Note 2 to entry: The terms three-ply board and triplex board can also be used instead of three-layer board.

[SOURCE: ISO 4046-4:2016, 4.186]

3.10
multi-layer board
board consisting of more than three furnish layers combined together during manufacture

Note 1 to entry: Two or more furnish layers may be of the same composition.

Note 2 to entry: The terms multi-ply board and multiplex board can also be used instead of multi-layer board.

[SOURCE: ISO 4046-4:2016, 4.122]

3.11
pasted board
board produced by the operation of pasting two or more boards of similar or different compositions

[SOURCE: ISO 4046-4:2016, 4.135]

3.12
corrugated fibreboard
board consisting of one or more sheets of fluted paper glued to a flat sheet of board or between several sheets

Note 1 to entry: Cf. single-face corrugated fibreboard, single-wall corrugated fibreboard, double-wall corrugated fibreboard, triple-wall corrugated fibreboard

Note 2 to entry: In this document, corrugated board is used for corrugated fibreboard.

[SOURCE: ISO 4046-4:2016, 4.49, modified — notes to entry added]

3.13
plasticizer
external plasticizer
non-reactive substance incorporated in an adhesive to improve the flexibility and resilience of the bond

Note 1 to entry: A plasticizer gives the adhesive film a greater extension at break, a lower modulus and a lower brittleness temperature. A plasticizer can be soluble in liquids and can migrate from the adhesive film.

[SOURCE: ISO 472:2013, 2.1549]

4 Symbols

$Cobb_{60}$	The calculated mass of water absorbed in 60 s by 1 m^2 of paper or board under specified conditions

D_R Visual reflection density

S_A Influx spectrum, standard CIE illuminant A

s_V Visual spectral responsivity (with V, the CIE photopic spectral luminous efficiency function)

p_{max} Maximum pressure

5 Requirements for boxes

5.1 General

Materials used shall not contain or form any substances, or have physical characteristics, which can be harmful to the documents being stored.

5.2 Boards

5.2.1 General

Various types of boards are used as materials for boxes.

For the purpose of this document, the following terms will be used: "board" and "corrugated board". The generic term "board" will be used for either "homogenous single-layer board", "two-layer board", "three-layer board", "multi-layer board" or "pasted board". The generic term "corrugated board" will be used for either "single-face corrugated fibreboard, single-wall corrugated fibreboard, double-wall corrugated fibreboard or triple-wall corrugated fibreboard".

5.2.2 Criteria of acceptance

Boards and corrugated boards shall:

— produce a loss of DP_v of the reference paper pieces (ωDP_v) less than 50 %, when tested according to ISO 23404;

— have an amount of alkali reserve capable of neutralizing at least 0,4 mol of acid per kilogram dry-weight of the board as specified in ISO 10716:2022, have a cold aqueous extract pH value in the range from 7,5 to 10,0, determined as specified in ISO 6588-1;

— shall be neutral sized or alkaline sized. Layers of corrugated board and pasted board shall be measured and meet the criteria individually. The separation of the different layers shall not be performed by soaking the board in water.

Two-layer, three layer or multi-layer boards do not need to be separated. The test values of unseparated two-layer, three layer or multi-layer boards, together with the manufacturer's warranty of the use of an alkaline process for all layers are acceptable.

5.2.3 Categories

Two types of board and corrugated board for boxes are specified:

— type A;

— type B.

Boxes made of type A board or corrugated board may be used without file covers. To avoid risk of degradation due to direct contact, boxes made of type B board or corrugated board shall be used together with file covers as specified in Clause 6. These file covers shall protect all the faces and edges of the documents.

All layers of type A board shall meet the requirements of Kappa number of less than 5 as specified in ISO 302 with the modification given in Annex A. Layers of corrugated board and pasted board shall be measured individually. Homogenous single-layer, two-layer, three-layer or multi-layer boards need not be separated. The test value of unseparated homogenous single-layer, two-layer, three layer or multi-layer board, together with the manufacturer's warranty of a Kappa number less than 5 and the use of rag or bleached chemical pulp for all layers are acceptable.

Type B board and corrugated board has no restriction in Kappa number and no limit in lignin content.

NOTE In addition to lignin, some dyes, pigments or other additives can increase the Kappa number.

If a board or corrugated board used for boxes consists of two or more layers of different types, where at least one layer does not meet the requirements for type A board, it shall be classified as type B.

The box shall be marked on the exterior with either:

— "Board ISO 16245-A" for boxes made of type A board;

— "Board ISO 16245-B" for boxes made of type B board.

5.3 Cloth covering

A box may be covered with cloth. Cloth covering without a finish as an additional coating or impregnation is predisposed to water absorption. For high resistance to water and water vapour the cloth used shall be coated or impregnated with a non-migratory resinous substance, e.g. acrylic resin. The surface shall be non-friable with the surface fibres fully coated.

NOTE The higher the thread thickness, the number of spun threads, the numbers of threads per cm for warp and weft the better is the resistance to mechanical stress as folding, tearing and rubbing of the cloth.

5.4 Lining

A box may be lined with paper. The paper used shall meet the requirements in 6.2, except for the grammage.

5.5 Adhesives

Boxes and boards should preferably be made without adhesives. If, however, adhesives are used, they shall be acid-free and shall not emit pollutants such as acetic acid that would degrade documents. When the boxes and boards are used for the storage of documents, the adhesives shall be fully cured.

They shall not contain plasticizers. The manufacturer shall specify the type of adhesive used and shall confirm the absence of plasticizer.

NOTE The term plasticizer denotes a non-reactive substance incorporated into a plastic/adhesive to improve flexibility and resilience. This is to be distinguished from plastics/adhesives using flexibilizers, also known as internal plasticizers. A flexibilizer is a co-reactant which, when incorporated into a polymer confers improved flexibility and resilience to the polymer. A plasticizer can be soluble and can migrate while a flexibilizer is not extractable and will not migrate.

5.6 Manufacturer's joints and fasteners

Use of manufacturer's joints for box assembly such as rivets, wire stitches or staples should be avoided. However, if metal manufacturer's joints are required, they shall be of a non-corrosive material, e.g. stainless steel.

5.7 Bleeding of colour or additives

There shall be no bleeding of the material of the box, lining and cloth covering included, when tested in accordance with the method specified in Annex B.

5.8 Surface

The $Cobb_{60}$ value shall be determined in accordance with ISO 535. The $Cobb_{60}$ value for the exterior of uncovered boxes shall not be higher than 25.

The surface shall be capable of being marked or labelled by appropriate, i.e., non-bleeding, mechanically and chemically permanent means.

5.9 Design

The box shall be designed so that it encloses file covers and documents and provides for their easy access and removal. The box shall not be designed to be air-tight.

No damage to the documents shall be caused by rivets, staples, etc., used in the construction of the box. If the box is provided with a facility for pulling the box out from the shelf, the construction shall not be such that the documents can be damaged. The box opening shall be designed to avoid any damage to the documents when they are taken from the box.

5.10 Strength

The box shall resist a pressure of at least 20 kPa when tested in accordance with the method specified in Annex C.

The box shall withstand repeated opening and closing at least 300 times.

The design should enable both vertical and horizontal storage, the vertical storage with the short or long side down. If the box is optimized for use in one position, this shall be indicated on the exterior of the box.

5.11 Dimensions

The internal dimensions of boxes shall be larger than the dimensions of the file covers and documents they contain and shall permit easy retrieval.

NOTE Dimensions of boxes, including tolerances, are typically provided by the user at the time of procurement.

6 Requirements for file covers and folders

6.1 General

Materials used shall not contain or form any substances, or have physical characteristics, which can be harmful to the documents being stored.

6.2 Paper and board

Paper and board shall meet the criteria given in 5.2.2. and shall have a Kappa number of less than 5, measured as specified in ISO 302 with the modification given in Annex A.

The grammage of the paper and board shall be determined in accordance with ISO 536. The grammage shall be at least 100 g/m^2.

The paper and board shall not contain optical brightening agents.

6.3 Adhesives

File covers and folders should preferably be made without adhesives. If, however, adhesives are used, they shall be acid-free and shall not emit pollutants such as acetic acid that would degrade documents.

They shall not contain plasticizers. The manufacturer shall specify the type of adhesive used and shall confirm the absence of plasticizer.

To avoid any direct contact between the adhesive and the document, the gluing junction shall be on the outer side of the file cover.

NOTE The term plasticizer denotes a non-reactive substance incorporated into a plastic/adhesive to improve flexibility and resilience. This should be distinguished from plastics/adhesives using flexibilizers, also known as internal plasticizers. A flexibilizer is a co-reactant which, when incorporated into a polymer confers improved flexibility and resilience to the polymer. A plasticizer can be soluble and can migrate while a flexibilizer is not extractable and will not migrate.

6.4 Fasteners

Use of fasteners such as rivets, wire stitches or staples should be avoided. However, if metal fasteners are required, they shall be of a non-corrosive material, e.g. stainless steel.

6.5 Bleeding of colour and additives

There shall be no bleeding of the material of the file cover and folder when tested in accordance with the method specified in Annex A.

Coloured file covers and folders shall have a tone and colour intensity such that they can provide a good readability of any future file ID marks being added on them; which will be detected by eye, or by copying, microfilming or scanning equipment. The visual density of the file cover, $D_R(S_A{:}s_V)$, shall not be higher than 0,20 when determined as specified in ISO 5-3 and ISO 5-4.

NOTE The readability of the information added to the file covers and folders (when copying, microfilming or scanning) is dependent on the density difference (i.e. contrast) between the file cover and the added marks or images.

6.6 Strength

The folding endurance of the paper shall be determined in accordance with ISO 5626. Paper with thickness up to 0,25 mm shall have a folding endurance in both directions (machine and cross) of at least 1,9 when determined with the instrument specified in ISO 5626:1993, A.1, or of at least 1,7 when determined with one of the instruments specified in ISO 5626:1993, A.2, A.3 or A.4.

Paper and board with thickness over 0,25 mm shall be scored, such as a straight channel pressed into the surface of paper to make folding of the paper possible or easier.

6.7 Dimensions

The dimensions of file covers shall be larger than the dimensions of the documents they contain and shall be compatible with the dimensions of boxes.

NOTE Dimensions of file covers, including tolerances, are typically provided by the user at the time of procurement.

7 Test report

The test report shall include the following:

a) a reference to this document, ISO 16245:2023;

b) the identification of the material tested;

c) the date and place of testing;

d) the test device/equipment name, model and maker for the mechanical tests;

e) the climatic conditions (temperature, relative humidity) of the local in which the mechanical tests were performed;

f) any other observations made that may be of importance to the capacity of the boxes or file covers to protect the enclosed documents;

g) any deviations from this document and any circumstances that may have affected the results;

h) the test results obtained when testing as specified in:

   1) 5.2.2, 5.2.3, 5.7, 5.8 and 5.10 for all archive boxes;

   2) 6.2, 6.5 and 6.6 for all file covers;

i) a statement that the item meets or fails to meet the requirements of this document; in the latter case the specific reason shall be stated.