INTERNATIONAL STANDARD

ISO 14416

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Information and documentation — Requirements for binding of books, periodicals, serials and other paper documents for archive and library use — Methods and materials

Information et documentation — Prescriptions relatives à la reliure des livres, des périodiques, des publications en série et des autres documents en papier à l'usage des archives et des bibliothèques — Méthodes et matériaux

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 14416 was prepared by Technical Committee ISO/TC 46, *Information and documentation*.

Introduction

Libraries and archives receive books, periodicals, serials and other paper documents which should remain in good physical condition for as long as their content is worth preserving.

Based on their judgement of the wear and tear of an item and its expected lifetime, the libraries and archives decide how each book, periodical, etc. shall be protected. It is the responsibility of an archive to preserve original documents, which may also involve the task of specifying paper quality for the future archive records.

The binding of library books and archive documents has traditionally been made in a manner complying with each binder's tradition and varying requirements from the customer. This International Standard serves as a tool for libraries and archives in comparing and evaluating quality in relation to price in a world of rapidly changing methods of book production and library use.

This International Standard for binding materials and methods is intended to promote

— appropriate binding qualities,

— to help binderies to rationalize their production including the application of automated systems, and

— to ensure continuity of supply of binding materials.

In order to reduce unit costs, libraries, archives and binderies have a common interest in complying to this International Standard. Binderies will be able to offer lower prices if they receive larger quantities of similar work, and libraries and archives will therefore be able to use binding more extensively as a protection for their books.

Annex A, normative, provides a description of a number of optional procedures that may be chosen as supplements to the fundamental binding procedures.

Three informative Annexes B, C and D, are included. Annex B provides guidance in choosing a binding method. Annex C gives information on performance tests for double-fan adhesive bound books. Annex D contains illustrations that show some of the requirements of this International Standard.

Information and documentation — Requirements for binding of books, periodicals, serials and other paper documents for archive and library use — Methods and materials

1 Scope

This International Standard is applicable to the binding of books, periodicals and archive documents which have special requirements for durability and permanence. The use, as well as the wear and tear, of library and archive documents varies. The choice of binding method should therefore relate to the appropriate requirements of a specific library or archive. The quality as well as the price of the binding is dependent on this choice.

It is applicable to the following general procedures:

— first-time hard-cover binding of published and unpublished materials, and any other documents requiring this type of protection;

— rebinding of hard-cover monographs, serials and any other documents.

It is not intended for binding volumes identified by a customer as having high artifactual or historical value, or for any volumes that, because of their physical characteristics, cannot or should not be bound according to this International Standard. Arrangements for special treatments should be made separately.

2 Normative references

The following referenced documents are indispensable for the application 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 534:1988, *Paper and board — Determination of thickness and apparent bulk density or apparent sheet density*

ISO 536:1995, *Paper and board — Determination of grammage*

ISO 1139:1973, *Textiles — Designation of yarns*

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

ISO 2062:1993, *Textiles — Yarns from packages — Determination of single-end breaking force and elongation at break*

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

ISO 9665:1998, *Adhesives — Animal glues — Methods of sampling and testing*

ISO 9706:1994, *Information and documentation — Paper for documents — Requirements for permanence*

ANSI L29.1:1977 (R 1984), *Fabric for Book Covers*[1)]

ASTM D 5035-90, *Standard test method for breaking force and elongation of textile fabrics (strip force)*

3 Terms and definitions

For the purposes of this International Standard, the following terms and definitions apply.[2)]

3.1
alkaline buffered paper
paper with a pH equal to or greater than 7,0, and containing a compound (e.g. calcium carbonate) at a level sufficient to neutralize acid generated from degradation of the paper, from adjacent materials, or from atmospheric pollution

3.2
all-along sewing
method of sewing a book where the sewing thread goes from kettle-stitch to kettle-stitch of each successive section, with one complete length of thread for each section

3.3
archive document
record consisting of original documents which are either single units or collected in a series

3.4
binding edge
edge of the gathered leaves or sections that is sewn, adhesive bound or otherwise secured

3.5
binding margin
distance between the binding edge and the printed area

3.6
book block
a gathering of leaves, including printed or written text and all papers added by the bookbinder, that can be or have been bound

See 3.43.

3.7
brittle paper
paper that will break when it is deformed by folding

NOTE The main causes of paper brittleness after long-term ageing are excessive acidity introduced during the manufacturing process, and unsuitable storage conditions which lead to deteriorative chemical and physical changes in the paper structure, especially if the paper is not alkaline buffered.

3.8
Buckram
coated and impregnated fabrics having a heavy base

1) May be obtained from the American National Standards Institute (ANSI) at the following address: ANSI 11 West 42nd. Street. 13th Floor, New York, NY 10036 USA.

2) The Figures in Annex D illustrate some of the definitions.

3.9
case
assembled covering material, boards and inlay ready to be attached to the book block

3.10
collation
checking for completeness and for putting the leaves, issues or sections of a book or serial publication in the correct order

3.11
double-fan adhesive binding
method of adhering loose leaves together at the binding edge to create a book block by applying glue to the leaves, first fanned out in one direction and then once again in the opposite direction

3.12
endpaper
folded sheet of paper attached to the book block, with each sheet facing the inner side of its board, adhesive being applied to the outer page of each endsheet when the book block is cased in

3.13
fanning out
process of working out the ends of a pile of sheets preparatory for gluing

3.14
flat back
a book that is not rounded or backed, resulting in a flat spine and fore edge

3.15
foil
a thin plastic film with a high vacuum deposit of metal or pigment and backed by a pressure and heat sensitive adhesive

3.16
guard
a strip of cloth or paper used as a hinge for a map, illustration or a single sheet; also referred to as compensating strips for thick inserts and maps

See also 3.42.

3.17
hard cover
cover of a book produced from a flexible material, usually cloth or paper supported by rigid boards

3.18
insert
additional element, such as printed leaf, blank paper or card, laid between the leaves of a book and not secured

3.19
joint
exterior juncture of spine and covers

3.20
kettle-stitch
stitch made near the head and tail of a book sewn by hand, and which holds the sections together

3.21
library corner
corner of the binding's cover in which the covering material, instead of being cut and abutted, has the excess taken up in one diagonal fold, and two turn-ins

3.22
machine direction
direction in a paper or a board corresponding to the direction of travel of the web on the paper or board machine

NOTE Machine direction is often, but not necessarily always, identical with “grain direction”, the direction in which the majority of fibres lie in a sheet of machine-produced paper or board.

3.23
milling
mechanical process used to roughen the edge of the leaves and/or to separate leaves in the preparation of the book block, usually for adhesive bindings

3.24
notch
grooves cut into the spine across the binding edge, often used to enlarge the contact area between glue and paper in adhesive binding

3.25
overhang
covering material extending beyond the edges of the board before turning-in

3.26
oversewing
method of sewing thin sections (i.e. piles) of leaves, one to another in succession, to create a semi-flexible book block

NOTE Oversewing can be done by hand or machine, almost always the latter in library binding.

See also Figure D.9.

3.27
paper covers
covers of the book block produced from an unsupported flexible material, usually paper

3.28
periodical
one or more serial issues of a title that may be bound together as a single unit

3.29
preservation
activities undertaken to prolong the life of an item, e.g. better storage conditions, proper handling

3.30
rebinding
process of replacing a binding using either the original or a new method of leaf attachment

3.31
re-casing
process of attaching the undamaged book block to a new case, or attaching an undamaged case to a repaired book block

3.32
rounding and backing
shaping of a book block by a special machine (or by hand)

NOTE Rounding results in the characteristic convex spine and concave fore-edge of a hard-cover book. Backing causes the edges of the signatures to fan out, producing a hinge for the cover boards to turn against after the book is bound.

3.33
section
unit of paper which is folded, hinged, sewn or otherwise held together and which with other like units makes up a complete book

3.34
sewing through the fold
method of attaching separate signatures, with the thread passing through the fold of the sections

3.35
shoulder
ridge on each side of the book block that is formed by the backing process

3.36
side sewing
method of securing the leaves of a book with thread near the binding edge, the thread passing through the entire thickness of the book block

See Figure D.12.

3.37
signature
each unit of folded leaves combined into a book

3.38
spine inlay
strip of card used to stiffen the spine of the case of a binding

3.39
spine lining
process of, or material used, in reinforcing the spine of a book

3.40
squares
board edges that extend beyond the book block at the head, tail and fore edges of a book

3.41
storage binding
type of binding using minimal intervention, applied to material which is little used

3.42
stubbing
blank papers used as a compensating material to smooth out any unevenness in the book block that would otherwise distort the book shape

See also 3.16.

3.43
text block
a gathering of printed or written leaves that may be or have been bound, excluding all paper to be added by the bookbinder

See 3.6.

3.44
two-on
method of sewing a book by hand in which two sections are sewn on a single length of thread from kettle-stitch to kettle-stitch

3.45
turn-in
part of the covering material that extends over to the inside surface of the boards and the spine area

3.46
whip-stitch
method of hand-sewing single sheets into sections, similar to overcasting

4 Principles

This International Standard has been developed for libraries and archives to help them preserve and make better use of their collections and records by means of binding.

It is based on specified binding methods and is intended to ensure that the customer gets a satisfactory and uniform binding, regardless of the bindery selected.

Standards that aim to ensure a certain quality level often describe a method, and/or contain requirements on test values, that the finished products shall meet. Today's test methods are, however, not sufficiently conclusive as regards the quality requirements on the finished binding. This International Standard will therefore be subject to continuous revision based on gained experience and changing requirements.

There is no single test method for all types of books. In order to judge the quality of double-fan adhesive-bound books, however, a set of test methods that gives some information about the binding quality are described in Annex C.

This International Standard is directed to all libraries/archives with a need to bind their books and documents. Institutions have different requirements, which broadly can be identified as four types of use, categories A, B, C and D. This does not, however, exclude that other requirements or combinations of requirements can be specified. All treatments should be applied with concern for the integrity of the item. This is particularly important for category D when the item may demand future treatment intended for long-term storage.

A library or archive wishing to bind its books should first consider a category appropriate to the needs of the institution. According to the grade of permanence or durability required, a suitable book-block treatment will then be chosen. The treatments correspond to different binding techniques. For example, in category A, only one book-block treatment is available but in category B, three treatments are available.

The types of use can be defined as follows, book block treatments being given in Clause 7.

Category A: Permanent retention of material that is acquired with folded sections/signatures intact. Intended for use by libraries and archives for material which is considered to have a permanent value and for which binding is selected as the storage method.

Book-block treatment T1: Sewing through the fold

Category B: Permanent retention of material acquired in single-leaf form and which is loose, stapled or glued together. Intended for use by libraries and archives for material which is considered to have a permanent value and for which binding is selected as the storage method.

Book-block treatments: T2: Oversewing

T3: Double-fan adhesive binding

T4: Side sewing

Category C: Heavy use for short periods of time for material that is acquired with folds intact, in single-sheet form or is an undamaged book block. Intended for use by libraries and archives for material which needs protection because it is expected to be subjected to heavy use over short periods of time but which might not be retained permanently.

Book-block treatments

T1: Sewing through the fold

T2: Oversewing

T3: Double-fan adhesive binding

T4: Side sewing

T5: Re-casing

Category D. Intermediate use. Intended for use by libraries and archives for protection of material which is expected to receive occasional light use but needs some protection during storage.

Book-block treatments

T4: Side sewing

T5: Re-casing

T6: Storage binding

5 Materials

5.1 General principles

The materials used in binding shall not contain or produce in the future, either in themselves or through interaction with other materials or with the environment, any substances which are liable to cause any damage to the documents.

The specific requirements take precedence over the general requirements which should be seen either

— as additional requirements in conjunction with the specific requirements,

— or as the recommended product where specific requirements are lacking.

Alternative materials may be used provided that they meet or exceed the performance of the specified materials.

5.2 Requirements

5.2.1 Paper and board

5.2.1.1 Endpaper

Specific requirements:

Endpapers shall be made from paper conforming to ISO 9706. They shall have a minimum grammage of 110 g/m^2 and a maximum grammage of 160 g/m^2. The tear resistance shall be of a minimum of 1 120 mN as measured by the Elmendorf method, described in ISO 1974. Grammage shall be determined according to ISO 536.

5.2.1.2 Papers for stubbing, pockets, and setting out inserts

Specific requirements:

Papers used for stubbing, pockets, and setting out inserts shall be made of paper conforming to ISO 9706.

5.2.1.3 Spine inlays

Specific requirements:

Spine inlays shall be made from board with a minimum grammage of 225 g/m^2. Paper of a grammage below 225 g/m^2 may be used for books with a spine width up to 15 mm. Grammage shall be determined according to ISO 536.

5.2.1.4 Boards

Specific requirements:

a) Board density shall be within the range of 0,6 g/cm^3 to 1,0 g/cm^3 when the apparent sheet density is measured according to ISO 534.

b) pH shall be $\geqslant$ 6 as tested by ISO 6588, cold water extract procedure.

General requirements:

All boards shall have adequate an internal bond to resist delamination. Resistance to corner crush, edge crush and warping are critical factors.

For books which are being considered for both permanent retention and heavy use, a board density higher than 0,8 g/cm^3 is recommended.

5.2.1.5 Reinforcement paper

Specific requirements:

Reinforcement paper shall meet the requirements of ISO 9706 and have an adequate strength. For books which are being considered for both permanent retention and heavy use, a grammage of more than 120 g/m^2 is recommended. Grammage shall be determined in accordance with ISO 536.

5.2.2 Fabrics

5.2.2.1 Cloth for endpapers

Specific requirements:

The warp thread shall have no less than 30 warp threads per centimetre, and not less than 28 filling threads per centimetre.

The tensile strength of the warp threads shall be not less than 80 N/cm of cloth. The tensile strength of the filling threads shall be not less than 35 N/cm of cloth. Both shall be measured according to the strip method described in ISO 5081.

5.2.2.2 Stretchable fabric for lining the spines of double-fan adhesive-bound book blocks

General requirements:

The spines of double-fan adhesive-bound book blocks shall be lined with a fabric, that does not break during rounding and backing, and which preferably does not rapidly absorb the adhesive.

5.2.2.3 Cloth for lining spines after rounding and backing

Specific requirements:

The spines of book blocks shall be lined with a woven fabric.

The tensile strength of the warp threads shall be not less than 95 N/cm of cloth. The tensile strength of the filling threads shall be not less than 75 N/cm of cloth. Both shall be measured according to the strip method described in ISO 5081.

Alternative material for lining spines may be substituted for woven fabric, providing that it meets or exceeds the performance of the woven fabric as specified above.

5.2.3 Covering materials

Specific requirements:

Covering materials, including those that are pre-printed, shall be coated or impregnated with a non-migratory resinous substance, e.g. acrylic resin and shall conform to the specifications for Group F Buckram in ANSI L29.1.1977.

General requirements:

Cloths shall be highly resistant to folding, tearing and rubbing. They shall be light resistant and suitable for direct lettering. The surface shall be non-friable with the surface fibres fully coated.

(For optional procedures, see A.4 and A.5.)

5.2.4 Adhesives

5.2.4.1 Adhesives for all processes

Specific requirements:

Adhesives shall not contain PVC, and have a pH value of $\geqslant 7$.

General requirements:

Adhesives used for all processes shall be capable of forming a durable bond between the surfaces to be joined. The adhesive force shall be such that the bonded materials cannot be separated without damaging them, except by the use of specialist techniques. Adhesives shall have a good durability, a good adaptability to all kinds of paper and good ageing characteristics. They shall also be resistant to biological attack.

5.2.4.2 Adhesive for double-fan adhesive binding

Specific requirements:

The adhesive used for double-fan adhesive binding, gluing the spine and lining up the spine shall be an internally plasticized polymer e.g. polyvinyl acetate, PVAc, specially formulated for this purpose, that will not cross-link on long-term ageing at normal indoor temperatures (20 °C to 30 °C).

5.2.4.3 Adhesive for gluing the spine, and lining up the spine

Specific requirements:

The adhesive used for gluing the spine and lining up the spine shall be an internally plasticized polymer e.g. polyvinyl acetate, PVAc, that will not crosslink on long-term ageing at normal indoor temperatures (20 °C to 30 °C).

(For options see A.6.)

5.2.4.4 Adhesive for making the case/cover

Specific requirements:

The adhesive for making the case shall be an internally plasticized polymer adhesive or animal glue.

5.2.4.5 Adhesive for casing-in

General requirements:

The adhesive for casing-in shall be compatible with the adhesive used to make the case, so that the case adheres tightly and securely to the book block.

5.2.5 Thread

5.2.5.1 Thread for oversewing

Specific requirements:

Thread for oversewing shall be cotton, nylon or cotton-covered polyester. Breaking strength shall not be less than 15 N as measured by ISO 2062.

5.2.5.2 Thread for sewing through the fold

Specific requirements:

Thread for sewing through the fold by machine shall be cotton, nylon or cotton-covered polyester, and shall be of appropriate caliper to control swell. Breaking strength shall be not less than 15 N as measured by ISO 2062. Threads of the same quality shall be used for sewing through the fold by hand, except that linen (or hemp) thread may also be used.

5.2.5.3 Thread for side sewing

Specific requirements:

Thread for side sewing shall be cotton, nylon or cotton-covered polyester, and shall be of a thickness equivalent to cotton thread R 72 tex f4 as described in ISO 1139, and have a breaking strength not less than 15 N as measured by ISO 2062.

5.2.6 Sewing tapes

Specific requirements:

Sewing tapes shall be cotton or linen, shall be not less than 13 mm wide, and shall have not less than 40 warp threads per centimetre and not less than 13 filling threads per centimetre.

The tensile strength of the warp threads shall be not less than 290 N/cm of cloth. The tensile strength of the filling threads shall be not less than 107 N/cm of cloth. Both shall be measured according to the strip method described in ISO 5081.

5.2.7 Stamping foils and inks

General requirements:

Stamping foils must stick well, shall not oxidize and be clearly legible during the lifetime of the binding. Inks shall be acid free.

5.2.8 Plastic lamination materials

Specific requirements:

Plastic lamination materials shall be either polyester or polypropylene foil with an acrylic adhesive.

(For options see A.12.)

General requirements:

Plastic lamination materials shall have a good flexibility, good transparency, colourless appearance, silk or semi-matte appearance, good dimensional stability, good durability as regards folding, high resistance to abrasion and good ageing properties. The plastic film shall not stick to surfaces with which it may come into contact.

6 General rules for all treatments

6.1 Preparation

All staples shall be removed.

6.2 Paper and board

Endpapers, guards, paper for stubbing, pockets, setting out inserts, spine inlays and boards shall be positioned with the machine direction parallel to the binding edge.

6.3 Reinforcing cloth

The warp thread of the cloth shall run parallel to the binding edge.

6.4 Gluing up the spine

Adhesive shall be applied to the spines of all sewn book blocks prior to trimming. The adhesive shall thoroughly coat the spines. Book blocks shall be stacked squarely and allowed to dry without the use of a heating or drying device.

6.5 Trimming the book block

Book blocks shall be trimmed squarely, removing no more paper than is necessary. The trimmed edges shall be smooth. Excessive trimming of irregularly sized issues, for the purpose of making them uniform, shall be avoided. The binder shall leave book blocks untrimmed when necessary to preserve text, marginal notes, illustrations, and the folds of maps and other inserts. Volumes that will be re-cased, and that are already rounded and backed, shall be left untrimmed.

(See option in A.9.)

6.6 Rounding and backing

6.6.1 Process

Book blocks shall be evenly rounded to form a smooth, convex spine and a concave fore edge; and shall be backed to form shoulders that are symmetrical, uniform head to tail, and of a size compatible with the chosen board thickness.

NOTE For an illustration of rounding and backing, see Figure D.2.

6.6.2 Exceptions

— Double-fan adhesive-bound book blocks shall be rounded but only slightly backed with a small shoulder, so as not to break the book block or lining material.

— Book blocks that have been sewn through the fold, and have signatures thicker than 6 mm, may be rounded but shall not be backed.

— Rounded and backed book blocks to be re-cased shall be re-rounded and backed only if they are poorly shaped and have strong sewing thread and paper.

— Flat-backed book blocks to be re-cased shall be rounded and backed only if they have strong sewing thread and paper.

— Book blocks less than 7 mm thick, book blocks containing fragile paper and side-sewn book blocks shall not be rounded and backed.

6.7 Lining up the spine

The spines of all books shall receive two linings. The first shall be a woven material which extends at least 25 mm onto each endpaper. The second lining may be paper covering the spine from shoulder to shoulder.

A single lining of woven material extending onto each endpaper is permissible on a volume measuring less than 30 mm in thickness, when a double lining will affect the ease of opening.

A single spine lining may be used if a high-quality lining material is used to achieve equal or better performance than a double lining.

Double-fan adhesive-bound books which have already received a first lining, shall receive a second lining which shall cover the spine from one shoulder to the other.

NOTE For an illustration of spine lining, see Figure D.3.

6.8 Case construction

6.8.1 Cutting the covering material

Covering material shall be cut squarely, and the turn-ins shall be at least 15 mm.

6.8.2 Selecting and cutting boards

Boards shall be cut squarely and smoothly. The height of the boards shall be a total of approximately 6 mm taller than the book block, unless the book block is to be bound flush with the bottom of the case.

(See option in A.11).

The width of the boards for rounded and backed volumes shall be equal to the width of the book block from shoulder to fore edge (the creation of the grooves will be allowed by the distance between the inlay and the board as described in 6.8.4). The width of the boards for flat-backed volumes shall be approximately 5 mm narrower than the width of the book block. The thickness of the boards shall be between 1,5 mm and 4 mm, and appropriate for the size and weight of the book block.

6.8.3 Selecting and cutting the spine inlay

An inlay shall be used to reinforce the spine of the case. The inlay shall be cut squarely with the machine direction parallel to the spine, and shall be the same width as the spine of the book, block from shoulder to shoulder, and the same height as the boards.

6.8.4 Assembling the case

The boards and the inlay shall be squarely and securely adhered to the covering material. The spaces between the inlay and the boards shall be uniform and 5 mm to 12 mm wide, according to the thickness of the board used. The corners of the cloth shall be left uncut so that library corners can be made, or shall be cut at a 45° angle so that traditional corners can be made.

The covering material shall be turned in tightly and uniformly, and shall adhere neatly and tightly to the edges of the boards.

NOTE For an illustration of case assembling, see Figure D.4.

6.8.5 Case reinforcement

For all books in categories A to C, thicker than 15 mm, the head and tail of the case spine may be reinforced with a piece of cord approximately 3 mm in diameter placed under the turn-ins.

6.8.6 Casing-in

Book blocks shall be cased-in squarely and tightly. All squares shall be uniform around the perimeter of the book block ; and shall be 3 mm $\pm$ 1 mm wide, depending on the size of the book block.

(See option in A.11.)

The book block shall be fitted squarely and tightly into the case with the endpapers adhering smoothly to all surfaces, without wrinkles and bubbles.

The completed book shall be free of warping.

6.9 Lettering

Lettering shall be permanent, sharp, clean, legible, and applied with adequate pressure, temperature, and dwell to ensure adhesion of the foil to the covering material. Uniformity of typefaces, lettering layout and colour of foil for serial titles shall be maintained whenever possible. (For paper-cover treatment, see option in A.12*).*

6.10 Quality control

The contractor shall ensure that the finished product fully meets the specifications ordered.

The following points shall be especially considered:

— the case and the edges of the book block shall be free from adhesives;

— the spelling of the title shall be correct;

— workmanship shall be neat and precise;

— machine direction of the materials shall be correct;

— there shall be good operability, with regard to the method of leaf attachment and paper quality.

7 Book-block treatments

7.1 General

Specifications are set forth for the following methods of securing the book block (including leaf attachment):

— T1: sewing through the fold;

— T2: oversewing;

— T3: double-fan adhesive binding;

— T4: side sewing;

— T5: re-casing;

— T6: storage binding.

Collation and choice of treatments (T1 to T6) shall be clearly specified.

(For options see A.2.)

7.2 T1: sewing through the fold

7.2.1 General

Signatures may be sewn through the fold by hand, using one needle and one thread, or by machine, using multiple needles and threads. A volume consisting of a single signature may also be sewn through the fold to secure the leaves and to attach them to the endpapers.

7.2.2 Preparation

Existing sewing threads shall be cut and the signatures pulled apart. As far as possible, old glue and paste shall be removed from the section edges. Damaged sections shall be repaired using methods and materials which in themselves are not harmful to the original material. Loose leaves or stiff inserts shall be hinged or tipped in.

7.2.3 Process

7.2.3.1 Sewing through the fold by hand

For optimum ease of opening and durability, tapes shall be used on all volumes sewn through the fold by hand. Book blocks less than 200 mm high shall be sewn on at least two tapes; those between 200 mm and 300 mm on three tapes; and those over 300 mm on four or more tapes. All tapes shall extend at least 25 mm onto the endpapers. The kettle-stitches shall be no closer than 6 mm, and no further than 25 mm from the head and tail of the book block after trimming.

When a volume is being resewn, and original sewing holes exist, these should be used whenever possible. Sewing shall be all-along except on volumes with many thin signatures, in which case sewing may be two-on for all but the first six and the last six signatures. When a book block consists of a single signature, it shall be sewn through the fold by hand using a sewing pattern based on a figure eight, with stitches no longer than 50 mm.

NOTE For an illustration of sewing by hand on tapes, see Figure D.5. For an illustration of sewing a single signature, see Figure D.6.

7.2.3.2 Sewing through the fold by machine

Signatures shall have as many stitches as the book-sewing machine can employ, except for a distance of approximately 10 mm from the head to the tail, which shall be left without stitches. Volumes sewn through the fold by a book-sewing machine may be sewn on tapes. When a book block consists of a single signature, it shall be sewn through the fold by machine using a lock-stitch, with stitches not less than 10 mm long.

7.2.4 Endpaper construction

7.2.4.1 Endpapers for volumes comprised of multiple signatures

Endpapers for volumes comprised of multiple signatures to be sewn through the fold by hand or by machine include the following aspects.

— **V1: retention of paper covers.** The endpaper shall consist of at least one sheet reinforced with cloth. The cloth shall extend 15 mm on the outside of the endpaper and 5 mm on the back of the cover. Care should be taken to avoid the loss of text or illustrations on the paper cover.

— **V2: non-retention of paper covers.** The endpaper shall consist of at least one folded sheet, with a 20 mm wide reinforcing cloth glued to the outside of the fold with 15 mm on the front and 5 mm on the back.

(For options see A.7).

NOTE For an illustration of V1 endpaper construction, see Figure D.7. For an illustration of V2 endpaper construction, see Figure D.8.

7.2.4.2 Endpapers for volumes comprised of a single signature

Endpapers for volumes comprised of a single signature to be sewn through the fold by hand or by machine shall consist of two folded sheets. The fold of the outer sheet shall be reinforced with a 30 mm wide reinforcing cloth strip. The signature and the endpapers shall be sewn through the fold as a single unit.

7.3 T2: oversewing

7.3.1 General

Oversewn volumes shall have a minimum binding margin of 12 mm after milling. For volumes with narrower margins, an alternative method of leaf attachment shall be chosen.

7.3.2 Preparation

The spine shall be milled or trimmed, if necessary, to free the leaves for sewing. No more than 3 mm of the binding edge shall be removed.

7.3.3 Process

All volumes shall be divided into uniform sections approximately 2 mm thick; the thickness may vary depending on the nature and condition of the paper. Sewing shall be no closer than 10 mm, and not further than 25 mm from the head and tail of the book block after trimming. In no case shall the sewing stitches be closer to the text than 6 mm.

7.3.4 Endpaper construction

Endpapers for oversewing shall consist of a single folded sheet tipped 6 mm in from the edge of a single leaf to make three leaves. A 40 mm strip of reinforcing cloth shall be adhered along the binding edge of the folded sheet and the exposed 6 mm margin of the single leaf. After sewing, the outermost leaf shall be folded back

and tipped back flush and parallel to (but not extending beyond) the binding edge of the book block, to cover the sewing thread and to allow the endpaper to hinge from the binding edge.

NOTE For illustrations of endpaper construction and endpaper sewing, see Figure D.10.

7.4 T3: double-fan adhesive binding

7.4.1 General

Double-fan adhesive binding is a method of adhering loose leaves together at the binding edge to create a book block. An adhesive that meets the requirements in 5.2.4.2. shall be used.

Book blocks more than 60 mm thick or weighing more than 2,5 kg should not be double-fan adhesive bound.

When deciding whether the double-fan adhesive binding method is suitable, the following must be taken into account:

— the machine direction;

— whether or not the material is in a physical state to withstand the structure;

— the flexibility and surface finish of the paper;

— the size and weight of the book.

NOTE Annex C contains information on performance tests for double-fan adhesive-bound books.

7.4.2 Preparation

The spine of the book block shall be milled or trimmed if necessary, to free all leaves so that they may be fanned. As many paper fibres as possible shall be exposed for optimum linkage of paper and adhesive by means of sanding (for coated papers) or notching. If the spine is notched after milling, notches shall be no deeper than 3 mm, and in no case shall they cut into the text.

7.4.3 Process

The book block shall be securely clamped. The binding edge shall be fanned first in one direction, as adhesive is applied by hand or machine using a roller or a brush; and then in the opposite direction, as adhesive is applied again. The penetration of adhesive between each leaf shall be at least 0,5 mm, but no adhesive shall penetrate further than 3 mm, and in no case shall it reach into the text. If the binding edge is notched, all notches shall be completely filled with adhesive.

NOTE For an illustration of the double fanning and glueing of the book block, see Figure D.11.

A stretchable spine lining shall be squarely and tightly adhered to the spine of the book block, either before or after the initial glue has dried. The lining shall cover the entire spine, and extend squarely onto each endpaper by at least 25 mm. The book block shall be positioned squarely and allowed to dry without the use of a heating or drying device.

7.4.4 Endpaper construction

Endpapers for double-fan adhesive binding.

— **V1: retention of paper covers** (of grammage greater than 175 g/m^2). The endpaper shall consist of a single folded sheet hinged to the cover with reinforcing cloth. The cloth shall extend 15 mm on the outside of the endpaper and 5 mm on the back of the cover. Care shall be taken to avoid the loss of text or illustrations on the paper cover. The endpaper shall be tipped to the book block during the fanning operation.

— **V2: non-retention of paper covers.** The endpaper shall consist of a single folded sheet, which is tipped to the book block during the fanning operation.

7.5 T4: side sewing

7.5.1 General

Side sewing is a method of attaching signatures or loose leaves together, by machine or hand sewing the entire book block through the side along the binding edge, in a single pass. No book block more than 12 mm thick, or with a binding margin less than 20 mm wide, shall be side sewn.

NOTE For an illustration of side sewing, see Figure D.12.

7.5.2 Process

A lock or whip stitch shall be used. Stitches shall be approximately 10 mm long. The sewing shall be no further from the head and tail of the book block than 10 mm after trimming, and shall be from 3 mm to 5 mm in from the binding edge.

7.5.3 Endpaper construction

Endpapers for volumes that will be side sewn.

A single folded sheet shall be attached at the binding edge on both sides of the book block. The spine of the book block shall be lined with cloth and the lining shall extend squarely onto each endpaper at least 20 mm. The book block shall be sewn through in its entirety from head to tail.

(For options see A.7).

7.6 T5: re-casing

7.6.1 General

When book blocks are intact, i.e. when the original sewing thread is unbroken and the number of stitches is adequate for the size and weight of the book block, the sewing can be retained and the book block fitted with a new case. This includes the application of a case to a soft-cover book where the book block is sewn.

7.6.2 Preparation

Old covers, adhesive, and spine lining shall be carefully and completely removed from the book block without damaging the sewing thread. The book block shall be inspected after the spine is cleaned. If the original sewing is not sound, minor repairs shall be made, or a different method of leaf attachment shall be selected.

7.6.3 Process

New endpapers shall be sewn to the book block using a method that is compatible with the original sewing structure. For book blocks sewn through the fold, endpapers shall be attached by sewing through the folds of one or two outermost signatures of the book block (in order to secure them), and then through the fold of the endpaper. For volumes that are oversewn, the endpaper shall be whip-stitched on with sewing stitches approximately 25 mm apart.

7.6.4 Endpaper construction

7.6.4.1 Endpapers for volumes that were originally sewn through the fold

The endpaper shall consist of a single folded sheet which shall be sewn on to the book block through a strip of cloth, with stitches approximately 25 mm apart. The strip of cloth shall be glued down at least 10 mm onto the spine and 20 mm onto the endpaper.

(For options see A.8.2).

NOTE For an illustration of endpaper sewing for volumes originally sewn through the fold, see Figure D.13.

7.6.4.2 Endpapers for oversewn and side-sewn volumes to be re-cased

Endpapers shall consist of a single folded sheet tipped 6 mm in from the edge of a single leaf to make three leaves. A 40 mm strip of reinforcing cloth shall be adhered along the binding edge of the folded sheet and the exposed 6 mm margin of the single leaf. After sewing, the outermost leaf shall be folded back and tipped back flush and parallel to (but not extending beyond) the binding edge of the book block, to cover the sewing thread and to allow the endpaper to hinge from the binding edge.

(For options, see Annex A.8.1 for oversewn volumes, and A.8.3 for side-sewn volumes.)

NOTE For an illustration of endpaper sewing, see also Figures D.9 and D.12.

7.7 T6: storage binding

Any book block that is considered to be intact may be fitted with a new case in a storage binding. This binding is a “shelf binding” restricted to books with minimal circulation. The binding should be regarded as a protection that could be changed easily, should the book need to be subjected to heavy use in the future. The process is similar to re-casing with the following exceptions:

— a tipped on single folded sheet is used as endpaper;

— no old glue is removed;

— no trimming;

— no rounding or backing.

For lining up the spine, see 6.7; for case construction, see 6.8; and for casing-in, see 6.8.6.

Annex A
(normative)

Binding procedure options

A.1 General

The following clauses and subclauses refer to important steps in the binding process that should be performed according to customer needs. If these steps are included, they shall be performed as described here.

After a careful inspection, taking into account the condition of the material and its existing structure, an appropriate method of binding or rebinding will be specified having regard for the machine direction, size of binding margin, quality of paper, original leaf attachment, age and integrity of the item.

(See decision check-list in Annex B).

An examination of the head, fore edge, and tail margins shall be made to identify those volumes that cannot be trimmed without cutting into text or illustrations.

A.2 Examination and collation

A.2.1 Books

Books shall be collated. Missing pages and defects shall be noted for action. For thick volumes, the book can either be split and bound into two or more volumes or bound flush with the bottom of the case, i.e. the case will have no squares at the tail.

A.2.2 Periodicals

For thick volumes, the book can either be split and bound into two or more volumes or bound flush with the bottom of the case, i.e. the case will have no squares at the tail.

A.2.2.1 Customized periodical collation

Customized periodical collation shall include one or all of the following services: placement of title page, table of contents, index, supplements and other inserts, if any; removal of covers and unpaginated advertising at the front and back of each issue; inspection to ensure correct order of issues; and examination for completeness and defects. Incomplete or defective volumes shall be noted for action or bound as they are.

A.2.2.2 Standard periodical collation

Standard periodical collation shall include inspection for completeness and correct order of issues. Title page, table of contents, index, supplements, and other inserts shall be bound in the order in which the binder receives them from the customer. Advertisements shall be left in place. Incomplete or defective volumes shall be noted for action or bound as they are.

A.2.3 Archive documents

A.2.3.1 Documents collation

All pages shall be received for treatment in a correct order and delivered in the same order.

A.3 Maps, illustrations and folded sheets

Steps shall be taken to prevent damage to maps, illustrations and folded sheets if the spine of the book block is milled, or trimmed.

Options include the following:

— selecting a method of leaf attachment requiring as little of the binding margin as possible;

— attaching the map or illustration on a strip of reinforcing cloth or paper meeting the requirements of ISO 9706 that is compatible with the weight and texture of the map or illustration;

— construction of a cloth or alkaline buffered paper pocket for maps and illustrations;

— leaving the book block untrimmed (together with any of the above).

Refolding of maps or other inserts to accommodate trimming or oversewing shall be avoided. When a pocket is constructed for an insert that is thicker than 5 mm, stubbing shall be added to the book block.

A.4 Light volumes

Lightweight volumes (i.e., those weighing less than 1 kg) may be covered with Group C-1 Book Cloth according to ANSI L29.1:1977.

A.5 Alternative covering materials

Alternative covering materials (including non-woven materials), used alone or together with reinforcing materials, may be substituted for Group F Buckram, provided these alternative materials meet or exceed the performance of the covering materials specified in ANSI L29.1:1977.

A.6 Adhesives for books sewn through the fold

Books sewn through the fold may be glued in the spine with a high-grade animal glue of the between 390 g Bloom and 530 g Bloom, measured according to ISO 9665. The same glue may be used for the spine linings of these books.

A.7 Endpapers for side-sewn books sewn through the fold

The endpapers may consist of a single folded leaf tipped to the binding edge of the book block.

A.8 Endpapers for books that are being re-cased

A.8.1 For books originally oversewn

The endpaper consists of a single folded sheet, reinforced with a cloth guard. The endpaper is tipped to the spine edge of the book block.

A.8.2 For books originally sewn through the fold

The endpaper shall consist of a single folded sheet with a 25 mm wide reinforcing cloth glued to the outside of the fold with 20 mm on the front and 5 mm on the back.

A.8.3 For books originally side sewn

The endpaper shall consist of a single folded sheet tipped to the spine edge of the book block.

A.9 Trimming

Volumes may be left untrimmed if this is requested.

The head and tail of books to be re-cased may be lightly trimmed.

A.10 Rounded corner covers

The corners of the boards may be slightly rounded.

A.11 Cutting flush with the tail edge

The normal practice when cutting the boards is to cut them to a total of approximately 4 mm to 6 mm taller than the book block to allow for the squares. However, on thick and/or heavy books, the tail squares make the book block sag so that the front and middle part of the edge rests on the bookshelf. Consequently, the upper part of the spine flattens out from its rounding and puts a strain on the joint area, eventually weakening the whole book structure. The degree of strain is proportional to the height of the squares.

This practice is traditional but not effective with coated and therefore usually heavier paper. This International Standard acknowledges the need to overcome this problem by making it a subject for agreement on how to bind these books. One possibility is to cut the boards flush with the tail edge of the book block. If that is done, the manufacturing of a book case is recommended.

A.12 Paper-cover treatment

The paper cover of the original binding may be transferred to the new hard covers, either in its original or in its reproduced state. This will satisfy those who want the outside of the book to resemble the original publisher's binding.

However, if the main concern of the library is to preserve the paper cover, this is best done by hinging it to the book block, protecting them on the inside of the boards. The same applies to dust covers.

Annex B
(informative)

Decision check-list

Question	Treatment	Special treatment	Option
1. Can the original binding be retained as it is ? Yes			No treatment
2. Does the book need a binding as a protection ? Yes	T1 to T6		
3. Is the book to be protected by boxing or other forms of storage ? Yes		Custom box or other specialist treatment	
4. Is the paper brittle ? Yes		Specialist treatment or reproduction	
5. Can the book be replaced ? Yes			New acquisition
6. Is the book considered to have artifactual value ? Yes		Specialist treatment	
7. Is the book block intact (damage only to the case) ? Yes	T5		
8. Will the book be subjected to heavy use ? Yes	T1 to T6		No tail squares (see question 26)
9. Does the book weigh less than 1 kg ? Yes			See A.4
10. Is the book block originally in sewn signatures ? Yes	T1 to T6		
11. Does the book need collation ? Yes	T1 to T4		Standard or custom collation. See A.2
12. Is the book originally adhesive bound ? Yes	T2 to T4		

Question	Treatment	Special treatment	Option
13. Is the book block between 0 mm to 60 mm thick ? Yes	T1 to T4		
14. Is the book block thicker than 60 mm with an inner margin of more than 12 mm ? Yes	T1, T2, T5, T6		
15. Is the machine direction not parallel with the spine ? Yes	T1, T5		
16. Is the paper heavily coated ? Yes	T1 to T6	Extra care for T3. See Annex C	
17. Is the paper unsuitable for adhesive binding ? Yes	T1, T2, T4		
18. Would you like to have the option of rebinding the book in the future with minimal damage to the paper ? Yes	T1		Use animal glue for glueing up the spine. See A.6
19. Is the paper thick or stiff ? Yes	T1, T5, T6		
20. Can the spine of the book block be mined or milled without cutting into the text or illustrations ? Yes	T2 to T4		
21. Is the soft cover to be retained? Yes	T1 to T6		Cover hinged
22. Is the book thinner than 12 mm ? Yes	T1, T3 to T6		
23. Is the cover to be mounted (cover transfer) ? Yes	T1 to T6		Cover mounted. See A.12.
24. Is the book in need of repair ? Yes		Specialist repair	Repair in the bindery
25. Is there a wish for an alternative endpaper ? Yes	T1, T4, T5		See Annex A.7 and A.8
26. Is the book block thick and/or heavy with the risk of it sagging down on the shelf ? Yes	T1 to T6		Bound flush with the bottom of the case. See A.11.

Question	Treatment	Special treatment	Option
27. Is the book to be left untrimmed ? Yes	T1 to T5		Trimming not allowed. See A 9.
28. Do you want to re-case any book, i.e. not interfere with the original leaf attachment, regardless of what type ? Yes	T5		T6

Annex C
(informative)

Comments on performance tests for double-fan adhesive-bound books, T3

C.1 General

In the publishers' binding industry, a certain degree of durability is often specified and samples are tested for pull strength, tear strength and flex number. These procedures are not applicable to library binding. In the binding of books, etc. for archive and library use, it is impossible to obtain exact specifications as the test values will vary from one book to another depending on the type of paper involved. It is, for example, a commonly known fact that uncoated paper is more strongly attached to the glue layer than coated paper.

To make clear the relationship between durability and the type of paper, and to guide the reader to what durability can be expected from T3 with different types of paper, the following comparison was carried out by "The Institute for Media Technology"[3], in Stockholm, in 1995, cf. Table C.1.

Though only intended to be an example and hence not referred to in any other way than the short description below, the test shows a typical difference between uncoated and coated papers.

Table C.1 — Test results from different adhesive-bound papers

Type of paper	Grammage	Flex number	Pull strength	Tear strength
	g/m^2	cycles	N/cm	N
1 Uncoated, chemical pulp	80	> 1 000	> 9,5	8,08
2 Uncoated, chemical pulp	80	> 1 000	> 9,5	9,18
3 Medium-weight coated, chemical pulp	80	311	6,94	5,14
4 High-weight coated Glossy, chemical pulp	100	88	5,47	3,63
5 High-weight coated, chemical pulp	100	254	7,53	5,70
6 High weight coated, mechanical pulp	80	236	5,78	4,33
NOTE The above figures shall not be regarded as recommended values, but as an example from one particular test. The lower values indicate a less durable binding than the higher values, and it is evident that coated and especially glossy paper is less strongly attached to the glue layer than the uncoated papers.				

C.2 Description of tests

C.2.1 Page-flex test

This test method has the purpose of simulating the way a user turns the pages in a book and how the book withstands such treatment.

Field of application:

This is a description of a method to determine how well the pages are attached to the book block. The method defines the number of cycles a page can withstand before it loosens from the book block. The result is expressed as flex number. The method should only be applied to adhesive bound-books.

3) The Institute of Media Technology, Box 5637, S-11486 Stockholm, Sweden.

C.2.2 Page-pull test

When a book is used, there could be a force on the page perpendicular to the spine. This test method simulates such behaviour and single pages are pulled from the spine of the book block and the breaking strength is measured.

Field of application:

This is a description of a method to determine how well the pages are attached to the book block. The method defines the breaking strength of the adhesive layer when a page is pulled perpendicular from the spine of the book block. The method should only be applied to adhesive-bound books.

C.2.3 Page-tear test

At normal use of the book, the separate pages could be torn from the book block. This test method simulates this behaviour and single pages are torn from the spine of the book block at a 45° angle and the tear resistance is measured.

Field of application:

This is a description of a method to determine how well the pages are attached to the book block. The method defines the tear resistance when a page is torn from the spine of the book block at an angle of 45°. The method should only be applied to adhesive-bound books.

Annex D
(informative)

Illustrations of bindings and binding techniques

See Figures D.1 to D.13.

Key

1	joint	5	tail	9	cover board
2	squares	6	shoulder	10	spine inlay
3	head	7	spine lining	11	library corner
4	cover material	8	endpaper	12	turn-in

Figure D.1 — Components of a book binding: book block and case

NOTE A reference to Figure D.2 is found in 6.6.1.

Figure D.2 — Rounding and backing

NOTE A reference to Figure D.3 is found in 6.7.

Figure D.3 — Book block with spine lining

NOTE A reference to Figure D.4 is found in 6.8.4.

Figure D.4 — Case assembling

NOTE A reference to Figure D.5 is found in 7.2.3.1.

Figure D.5 — Sewing by hand on tapes

NOTE A reference to Figure D.6 is found in 7.2.3.1.

Figure D.6 — Sewing of a single signature by hand

NOTE A reference to Figure D.7 is found in 7.2.4.1.

Figure D.7 — Endpaper construction with retention of paper covers, V1

NOTE A reference to Figure D.8 is found in 7.2.4.1

Figure D.8 — Endpaper construction without retention of paper covers, V2

NOTE A reference to Figure D.9 is found in 7.6.4.2.

Figure D.9 — Oversewing in the machine, showing endpaper construction

Key

A construction of the endpaper, before sewing.

B situation after sewing.

NOTE A reference to Figure D.10 is found in 7.3.4.

Figure D.10 — Endpaper construction for oversewing

NOTE A reference to Figure D.11 is found in 7.4.3.

Figure D.11 — Fanning and glueing the book block

NOTE References to Figure D.12 are found in 7.5 and 7.6.4.2.

Figure D.12 — Side-sewn book block

NOTE A reference to Figure D.13 is found in 7.6.4.1.

Figure D.13 — Sewing of endpaper for volumes originally sewn through the fold

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