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Guidelines for Information About Preservation Products

Abstract: Specifies the information that should be included in advertisements, catalogs, and promotional materials describing products used for the storage, binding or repair of library materials, including books, pamphlets, sound recordings, video-tapes, films, CDs, manuscripts, maps and photographs.

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Contents

Foreword v

1. Introduction 1
1.1 Purpose 1
1.2 Scope. 1

2. Referenced Standards 2

3. Glossary 2

4. Data Elements for Materials Used in Preservation Products 12
4.1 Paper 12
4.1.1 Scope 12
4.1.2 Applications 12
4.1.3 Data Elements 12
4.2 Paperboard and Card(board) 14
4.2.1 Scope 14
4.2.2 Applications 14
4.2.3 Data Elements 14
4.3 Cloth 14
4.3.1 Scope 14
4.3.2 Applications 14
4.3.3 Data Elements 15
4.4 Plastics 15
4.4.1 Scope 15
4.4.2 Applications 16
4.4.3 Data Elements 16
4.5 Adhesives 17
4.5.1 Scope 17
4.5.2 Applications 17
4.5.3 Data Elements 17
4.6 Paper and/or Board Composite Products 18
4.6.1 Scope 18
4.6.2 Applications 18
4.6.3 Data Elements 18

References 19

continued on page iv

Appendix A
Referenced Standards and Tests 20

1. Standards 20
1.1 American National Standards Institute (ANSI) 20
1.2 American Society for Testing and Materials (ASTM) 20
1.3 International Organization for Standardization (ISO) 20
1.4 National Information Standards Organization 20
1.5 Netherlands Normalization (NEN) 21
2. Tests 21
2.1 Standard Tests 21
2.2 Technical Association of the Pulp and Paper Industry (TAPPI) Tests 21
2.3 Trade Standards 22
3. Specifications 22
3.1 National Archives and Records Administration 22
3.2 Library of Congress 22

Foreword

(This foreword is not part of the American National Standard Guidelines for Information About Preservation Products, ANSI/NISO Z39.77-2000. It is included for information only.)

This standard specifies the information that should be included in advertisements, catalogs, and promotional material for products used for the storage, binding or repair of library materials, including books, pamphlets, sound recordings, videotapes, films, CDs, manuscripts, maps and photographs. It is not intended to set standards for the products themselves but to provide guidelines for the information that vendors use to describe their products.

The impetus to create this standard came in response to concerns expressed by librarians and archivists of the need for a qualitative means of evaluating preservation products. To address this concern, the NISO Z39.77 Committee was formed and one of their first tasks was to review product literature and catalogs from a wide range of commercial vendors. Following this review, the Committee created a series of data or compositional elements for products made of paper, paper board and card stock, cloth, plastics, adhesives, and paper and board composite products. The data elements are product components that when identified in the context of advertising copy provide the consumer with factual data needed to determine a product's permanence, durability and overall suitability for storage, binding, or repair of library materials. To help the reader use the standard, a glossary is included that defines technical terms. Also included are references to related standards.

The Standard was processed and approved for submittal to ANSI by the National Information Standards Organization. It was balloted by the NISO Voting Members September 1, 1997- November 15, 1997. It is scheduled to be reviewed in 2006. Suggestions for improving this standard are welcome. They should be sent to the National Information Standards Organization, 4733 Bethesda Avenue, Suite 300, Bethesda, MD 20814. NISO approval of this standard does not necessarily imply that all Voting Members voted for its approval. At the time it approved this standard, NISO had the following Voting Members:

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Guidelines for Information About Preservation Products

1. Introduction

1.1 Purpose

The purpose of this standard is to encourage and promote (a) use of consistent language and (b) the provision of accurate information by vendors of preservation products used for storage, binding, and repair of library materials. It is *not* intended to set standards for the products themselves but to provide guidelines for the information that vendors use to describe their products. Providing this information does not guarantee the fitness of such products for preservation use; however users of these products will benefit from the application of this standard as they compare and evaluate products.

Compliance is voluntary. Not all elements of information presented here are applicable to every product, nor is it possible to include all elements in every product description. Some information may be proprietary and unavailable. However, vendors are encouraged to use accurate and consistent language in all product descriptions, to include as much information as is feasible in catalogs, and to make complete specifications and test results available upon request.

1.2 Scope

This standard specifies the information that should be included in advertisements, catalogs, and promotional material for products used for the storage, binding, or repair of library materials, including books, pamphlets, sound recordings, videotapes, films, compact disks, manuscripts, maps, and photographs.

The standard breaks down product information into data elements including composition, description, and performance, for the following six basic types of materials used in preservation products:

- Paper
- Paperboard and card stock
- Cloth
- Plastics
- Adhesives
- Paper and board composite products.

The standard also includes definitions for terms commonly used to describe preservation products.

2. Referenced Standards

This standard is intended for use in conjunction with American National Standards and other standards cited in the Appendix. When these standards are superseded by an approved revision, the revision shall apply.

3. Glossary

This glossary has been compiled from various sources for use in the context of preservation housing. These sources appear in the reference list at the end of the standard. When the definition is a direct quotation, the source number is cited in parentheses.

acid. A chemical compound that tends to increase the concentration of hydrogen ions when it is dissolved in water. Acids have a pH below 7.0 and are capable of neutralizing alkalis. In the presence of atmospheric moisture, acids attack cellulose on a molecular level, breaking its long-chain structure and causing cellulosic materials to become weak and brittle. Acids may be introduced to paper during manufacture, from the environment, or through contact with adjacent material. (7)

acid free. In chemistry, materials that have a pH of 7.0 or higher. Sometimes used incorrectly as a synonym for alkaline. Acid-free materials may be produced from virtually any cellulose fiber source (cotton and wood, among others), if measures are taken during manufacture to eliminate active acid from the pulp. However free of acid a paper or board may be immediately after manufacture, over time the presence of residual chlorine from bleaching, aluminum sulfate from sizing, or pollutants in the atmosphere may lead to the formation of acid unless an alkaline substance is added to the paper or board. (1)

acrylic. A polymer or copolymer prepared from acrylic or methacrylic acids and their esters. The physical properties of the product can be made to vary widely through control of the nature and ratio of the monomers used and through control of the molecular weight and degree of cross-linking. (5,8) Acrylic is a plastic noted for transparency, light weight, weather resistance, color fastness and rigidity. In addition to these qualities, acrylics are important in preservation because of their stability, or resistance to chemical changes that may cause yellowing or increased haziness, a characteristic not common to all plastics. Acrylics are available in sheets, films, and resin adhesives. (1)

adhesive. A substance capable of bonding materials to each other. (3) Adhesives used for preservation work should not degrade, fail, discolor, or cause adjacent material to degrade or discolor.

alkali. A base substance having a pH above 7.0 and capable of neutralizing acids. (7)

alkaline reserve. The presence in paper of an alkaline earth salt that can neutralize acids and thereby prevent acid reactions that degrade paper, usually 2 to 3% (3 to 5% is also common) precipitated calcium or magnesium carbonate by weight of paper. This reserve absorbs and neutralizes acids as they are introduced and remains effective as long as unreacted alkaline salts are present. (7)

alkaline size. A process or procedure for introducing water resistance into paper and board at pH values above 7.0 in the stock at the point of sheet formation. (4)

antioxidant. Trace chemicals added to a polymer system to inhibit the oxidation process. Two main classes of antioxidants are used in polymers: primary and secondary. Primary antioxidants work by scavenging free radicals, thereby breaking the chain of autoxidation. Secondary antioxidants work by decomposing the hydroperoxides that form in an aging polymer, thereby preventing the catalyzation of the autoxidation process. Primary antioxidants include phenolics, aromatic amines and hindered amines; secondary antioxidants include trivalent phosphorus compounds and divalent sulfur compounds. (5,8)

antique finish. A rough finish obtained by reduced pressure of the calender rolls. It is considered to be rougher than eggshell and perceptibly rough to sight and touch. When used as a prefix, the term "antique" denotes a rougher finish as in Antique-Eggshell, Antique-Vellum. Antique finish is distinguished from eggshell by the design of the felt marks on the surface which is made up of relatively large hills and valleys that are long and narrow, running with the grain direction, whereas eggshell paper has smaller, rounder hills and valleys that are not as definitely aligned with the grain direction, and the paper presents a smoother surface appearance. (4)

antistatic coatings/additives. Trace chemicals (generally ammonium salts or amines) added to a nonconducting polymer system to promote the decay of static charge on surfaces. Quaternary ammonium salts are added as a coating; the amines are mixed into the product before forming, where they eventually rise to the surface. Both work by attracting ambient moisture to the surface, causing the decay of static charge. (5,8)

archival quality. A nontechnical term that suggests that a material or product is permanent, durable, or chemically stable, and that it can therefore be used safely for preservation purposes. The phrase is not quantifiable; at this writing, no standards exist that describe how long "archival" or "archivally sound" material will last. (1)

basis weight. Basis weight identifies printing papers, with few exceptions. In the United States it is the weight in pounds of a ream of paper (500 sheets) in the basic size for that grade. In the metric system it is the weight of one square meter of paper and is expressed in grams per square meter or g/m^2. Basis 70 means that 500 sheets 25 x 38 inches (635.0 x 965.2 mm) of book paper weigh 70 pounds. This is equivalent to 104 g/m^2 in the metric system.

In the U.S. system, the basic size is not the same for all grades: it is 25 x 38 inches (635.0 x 965.2 mm) for book papers (coated, text, offset, etc.); 17 x 22 inches (431.8 x 558.8 mm) for writing papers (bond, ledger, mimeograph, duplicator); 20 x 26 inches (508.0 x 660.4 mm) for cover papers (coated and uncoated); 22.5 x 28.5 inches (571.5 x 723.9 mm) or 22.5 x 35 inches (571.5 x 889.0 mm) for bristol and postcard; and 24 x 36 inches (609.6 x 914.4 mm) for newsprint. Paper is commonly identified by ream weight: 20 pound bond, 70 pound coated, etc. (2)

BHT. Butylated hydroxytoluene, a phenolic primary antioxidant that (like many phenolic antioxidants) can form a highly colored product (a red-yellow in the case of BHT) as a result of aging. Because the antioxidant is not part of the polymer chain, it can migrate out of a polymeric product and into an adjoining object, causing staining years after contact. (5,8)

board. Refers to mat board, binder's board, corrugated board and other types of paperboard that are made by pressing and compacting fibers, laminating plies, and/or fluting layers to create corrugations. Boards vary in quality and composition, depending upon their intended use. Thicker and heavier than paper stock, [board stock] is generally at least 0.012 inch (0.3048 mm) thick. The term also refers to book covers. (7)

bond. A grade of paper commonly used for letters and business forms. Originally a cotton-content paper distinguished by superior strength, performance, and durability. The term is now also applied to papers for a broad spectrum of applications and is made from cotton and/or chemical woodpulps. Bond papers have a basis weight range between 13 and 24 pounds. (4)

book cloth. A generic term for the woven fabrics used in covering books. They are usually woven cotton fabrics that may be bleached or mercerized, dyed, filled with pigment colors, starched, coated or impregnated, calendered, and embossed (grained). They are divided into classes according to type and quality. Specifications for the fabrics used for book cloths are:

Book Cloth (starch-filled and impregnated)		**Buckram (starch-filled and impregnated)**	
Group	*Weight*	*Group*	*Weight*
A	Light	D	Light
B	Medium	E	Medium
C	Heavy	F	Heavy
C-1	Heavy		

(3)

brightness. The reflectivity of pulp, paper, or paperboard for specified blue light measured under standardized conditions on a particular instrument designed and calibrated for this purpose. (4)

bristol. A general term for solid or laminated heavyweight printer paper made to a thickness of 0.006 inch (0.1524 mm) or higher. The name is derived from the original pasted rag content board made in Bristol, England. (4)

buckram. A strong, coarse woven cotton, sometimes linen, cloth that has been dyed and filled with starch under heat and pressure. Buckrams are frequently coated with pyroxylin or acrylic and are used for commercial library binding. (3)

buffer. See *alkaline reserve.*

bursting strength. A measure of the ability of a sheet to resist rupture when pressure is applied to one of its sides by a specified instrument, under specified conditions. It is largely determined by the tensile strength and extensibility of the paper or paperboard. Testing for bursting strength is very common although its value, except for limited, specific purposes is questionable. (4) It has been the most common measure used for corrugated board.

calendered. Paper with a surface glazed by means of calenders, the set of rolls at the end of the papermaking machine which impart a uniform nip pressure to level the thickness and/or smoothness and/or surface texture of the web of paper. (4)

caliper. A measurement of thickness. See also *mil; point; thickness.*

cambric. A fine, thin, closely woven plain fabric of either linen or cotton.

card(board). A general term applied to board 0.006 inch (0.1524 mm) or more in thickness where stiffness is the paramount characteristic. The word cardboard used by

the public is too vague to be technical. In the paper industry the term "board" is used in combination with words indicating its character such as bristol board. (4)

cellulose. A complex polymeric carbohydrate that forms the solid framework or cell walls of all plants. Also, the chief constituent of many plant products, including paper and some cloth. (7)

cellulose acetate. A modified natural polymer, produced by esterifying cellulose with acetic anhydride (using acetic acid as a solvent, with sulfuric acid as a catalyst). Wood pulp may be used as the source of cellulose, but most clear, noncolored cellulose acetate plastics are made from cotton linters. The degree of substitution can vary, from less than one acetate group per cellulose repeat unit (the anhydroglucose unit) to a fully substituted triacetate. Solubility, melting point, strength and other properties also vary as a result. (5,8)

chemical foaming agent (CFA). A substance that produces gas by thermal decomposition or by chemical reaction with other components of a polymer system. CFAs can include bicarbonates, sulfonyl hydrazides, and hydrazine/peroxide combinations. By producing gas in a solidifying polymer system, CFAs generate cells in the final product, yielding a foam. (5,8)

chemical stability. Resistance to decomposition or chemical modification. This is a desirable characteristic for materials used in preservation, because it suggests an ability to resist chemical degradation (such as the embrittlement of paper) over time and/or upon exposure to various conditions during use or storage. (1)

chemical wood pulp. Wood reduced to pulp via a chemical process. Specifically, paper made by cooking wood chips under pressure at high temperature using the soda, sulphite, or sulphate process. After cooking, the pulp is bleached and washed to remove the processing chemicals and other impurities. High quality and stable papers and boards can be made from chemical wood pulp. (7)

coated paper, coating. Paper with surface coatings (adhesives, clay, mineral pigments, etc.) to give a smooth hard finish suitable for printing or other applications. Coatings control ink absorption and give paper increased gloss and opacity. (7) The permanence of coated papers depends upon the quality of the materials used including the inner core of paper fibers.

color fastness. The property of paper, dye, or dyed paper to retain its color in normal storage or use or to resist changes in color when exposed to light, heat, or other deleterious influences. (4)

conservation. The treatment of library or archive materials, works of art, or museum objects to stabilize them chemically or strengthen them physically, ensuring their survival as long as possible in their original form. See also *preservation.* (1)

corrugated board. The structure formed by bonding one or more (paper) sheets of fluted corrugating medium to one or more flat facings of linerboard. Corrugated board is most commonly made in four flute sizes designated A-, B-, C-, and E-flute. (4)

dandy roll. The light skeleton roll or cylinder covered with wire gauze in the papermachine. The roll presses gently on the paper while still wet, thus producing the desired look-through in the finished sheet such as laid and wove, or the watermark. (6)

durability. The degree to which a material retains its original qualities under use. Not to be confused with permanence, which is the degree to which a paper resists chemical action that may result from impurities in the paper itself or agents from the surrounding air. (4)

eggshell finish. A relatively rough finish, so called because it resembles the surface texture of an eggshell. It is produced by the use of special felts that mark the paper as it enters the dryers with relatively round hills and valleys not definitely aligned with the grain direction. (4)

elasticity. The reversible stress-strain behavior by which a body resists and recovers from deformation produced by force. This behavior is exhibited by rubber-like materials in a unique and extremely important manner. Unlike metals or glasses, they can undergo very large deformations without rupture (similar to liquids) and then come back to their original shape (as do solids). (5,8)

embossing. A process that converts a smooth surfaced web (of paper) to a decorative surface by replicating the design on the rolls that form the nip of the embosser. (4)

fiber. A threadlike body or filament, many times longer than its diameter. Paper pulps are composed of fibers, usually of vegetable origin, but sometimes animal, mineral, or synthetic types of paper. (4)

fiberboard. Paperboard made of laminated sheets of heavily pressed fiber. (1)

fiber composition. The percentages of different types of fibers in pulp or a sheet of paper. (4)

filler. A material, generally nonfibrous, added to the fiber furnish of paper. (4) See also *loading.*

finish. Finish is a complex paper property related to its smoothness. Paper can be used as it comes off the driers of a paper machine (uncalendered), or it can be machine calendered or embossed, processes that vary greatly in smoothness. The usual finishes of uncoated book papers are, in order of increasing smoothness: antique, eggshell, vellum, or machine finish. Each of these finishes is produced on the machine. Some finishes are embossed on the paper after it leaves the machine by passing dry paper through a rotary embosser. A commonly used embossing pattern is linen. (2)

fire or flame retardant additives. Chemical additives that inhibit combustion of polymer systems by at least one of the following methods: volatilizing simultaneously with the polymer's thermal decomposition products and interfering with combustion of the fumes; leading the thermal decomposition path of the polymer toward carbonization rather than volatilization; and forming a protective coating to thermally insulate the bulk of the polymer. Most flame retardants belong to one of the following groups: ATH (alumina trihydrate), organochlorine compounds, organobromine compounds, organophosphorus compounds, antimony oxides, boron compounds. (5,8)

flute. The geometric configuration formed by one of the undulations of the corrugated medium in corrugated board. The exact dimensions of the flute will vary slightly, depending on corrugating roll contour, material characteristics, equipment, and technique. The three common types in conventional corrugated board used in shipping containers and boxes are A-, B- and C-Flute approximately 3/16, 1/32 and 5/32 inch high (4.7625, 0.7937, and 3.9687 mm) respectively (not including the thickness of the liners). The

number of flutes per foot are approximately 34-36, 47-50, and 39-42 for A-, B-, and C-Flute respectively. E- Flute and F-Flute approximately 1/16 and 3/64 inch high (1.5875 and 1.1906 mm) respectively, and spaced about 88 to 100 flutes per foot, are used mainly in corrugated board for folding cartons. See also *corrugated board.* (4)

folding endurance. The number of folds under specific conditions in a standard instrument that a paper will withstand before failure. (4)

furnish. The mixture of various materials that are blended in the stock suspension from which paper or board is made. (4)

gelatin. High molecular weight polypeptides derived from collagen, the primary protein component of animal connective tissues such as bone, skin, and tendon. (5,8)

grade. A class or level of quality of paper or pulp that is ranked, or distinguished from other papers or pulps on the basis of its use, appearance, quality, manufacturing history, raw materials, or a combination of these factors. Common grades of printing papers are bond, coated, text, newsprint, etc. (4)

grain (direction). Grain is an important factor for both printing and binding. It refers to the position of the fibers. During papermaking most fibers are oriented with their length parallel to that of the paper machine (machine direction) and their width running across the machine (cross direction). Grain affects paper in the following ways and these factors need to be considered in the proper use of paper: (a) paper folds smoothly *with* the grain direction and roughens or cracks when folding cross-grain, (b) paper is stiffer in the grain direction , and (c) paper expands or contracts more in the cross direction when exposed to moisture changes. (4)

groundwood (pulp). Also known as mechanical wood pulp. Groundwood pulp is created by mechanical means only; it retains all of the impurities of wood (including lignin). Groundwood pulp paper is weak, impermanent, and acidic; it discolors upon exposure to light and air. Newsprint is the most common example of groundwood pulp paper. (7)

inhibitor. Chemicals added to monomers (or other components of a polymer system) to prevent reaction during storage. Also, chemicals added during free radical polymerization to slow or stop polymerization. Generally, inhibitors are benzoquinones, aromatic nitro compounds (such as trinitobenzene), nitroso compounds, nitrones, substituted phenols, and aromatic amines (these last two are also used as antioxidants). (5,8)

kappa number. A test value that relates linearly to the amount of lignin remaining in pulp after pulping. 5 kappa = approximately 1% lignin remaining in the paper. (4)

laid. Laid papers are those which, when held up to the light, have a ribbed or lined appearance due to the paper being thinned by the wires of the mould in handmade papers, or of the dandy roll in machine-made papers. Up to the year 1755 all papers were laid, but since then are also wove. (6)

lamination. The process of adhering two or more sheets, plies, or boards together to make a single sheet or board with desired characteristics.

Light sensitive. Materials that are changed by the impact of light. (3) See also *color fastness.*

lignin. A component of the cell walls of plants that occurs naturally, along with cellulose. Lignin is largely responsible for the strength and rigidity of plants. More research is needed to determine the precise role of lignin in the permanence and durability of paper. (1) Its presence in paper and board is known to contribute to the loss of brightness. It can be, to a large extent, removed during manufacture. "Lignin free" usually implies a maximum of 1% lignin content, measured as kappa 5.

linen finish. A finish produced by compressing sheets of paper between alternate sheets of linen cloth so that the pattern of the cloth is impressed upon the surface of the paper. A similar effect is obtained by embossing with a steel roll that has been knurled or engraved to simulate linen cloth. (4)

loading. The incorporation of finely divided relatively insoluble materials, such as clay and calcium carbonate, in the papermaking composition usually prior to sheet formation to modify certain characteristics such as opacity, printability, finish, weight, etc., of the finished sheet. (4)

machine finish (MF). Any finish obtained on a paper machine. (4)

mechanical pulp. See *groundwood pulp.*

methyl cellulose. A nonionic cellulose ether, very soluble in water, prepared by the reaction of alkali cellulose with methyl chloride. Methyl cellulose (and similar cellulose ethers) when dissolved in water, gels when heated to specific temperatures (the temperature depending on rate of heating, stirring speed, and salts present). The viscosity of methyl cellulose solutions depends on the extent and uniformity of substitution. (5,8)

mil. A measure of thickness equal to one thousandth of an inch. See also *point, thickness.*

molecular weight. The molecular weight of any one molecule is the sum of the atomic weights of all the atoms contained in the molecule. If the compound consists of identical molecules, the molecular weight of the compound is defined as being the same as any of its molecules. For polymers, however, which are composed of a mixture of molecules of different sizes, due to the statistical nature of the polymerization process, the molecular weight is more complex. A complete description of the distribution can only be done by plotting the number of molecules having a particular size, yielding a curve (usually Gaussian). The median value in the curve yields a "number-average molecular weight" (M_n). This value can be obtained (without measuring and plotting the entire distribution) by various means, such as osmometry. Other averages (M_w, M_z, M_v) can be found, using other methods. Because the averages can vary greatly, depending on type, it is important to know which average is used to describe a polymer, particularly when making comparisons. (5,8)

mould, mold. Also referred to as paper-mould, a mould is a device consisting of a rectangular wooden frame over which brass wires or wire cloth is stretched to act as a sieve or strainer to permit the water to drain away from the pulp fibers, thus forming a felted sheet of paper. A wooden removable frame, the deckle, fits exactly over the mould forming a tray with raised edges, keeping the required thickness of pulp on the wires as the excess water drains away. The irregular edges of handmade paper (the deckle edges) are formed by some of the fibers lodging between the deckle and the mould. (6)

mouldmade. A term applied to an imitation handmade paper to distinguish it from genuine handmade. It is made on a cylinder or cylindrical mould revolving in a vat of

pulp, the various sizes being arrived at by dividing the surface with rubber bands to imitate the thinning of the deckle edge of handmade paper or by cutting the web with a jet of water. (6)

neutral. Exhibiting neither acid nor base (alkaline) qualities; 7.0 on the pH scale. (7)

opacity. Opacity relates to the show-through of the printed image from the opposite side of the sheet or the sheet under it. Paper thickness, fiber type, and the use of mineral fillers affect it. (2)

optical brighteners. Substances that are added to paper so that, when illuminated by daylight or other light containing ultraviolet, the paper fluoresces and appears brighter. (4)

paper. A general term for all kinds of matted or felted sheets of fiber formed on a fine screen from a water suspension. (4)

paperboard. One of the two broad subdivisions of paper, the other being paper. The distinction is not sharp but, broadly speaking, paperboard is heavier in basis weight, thicker, and more rigid than paper. In general, all sheets 12 points, (0.012 inch [.3 mm]) or more in thickness are classified as paperboard. (4)

permanence. Ability of a material to resist chemical deterioration, but not a quantifiable term. Permanent paper usually refers to a durable alkaline paper that is manufactured according to ANSI/NISO Standard Z39.48-1992(R1997) *Permanence of Paper for Publications and Documents in Libraries and Archives*. Even so-called permanent materials depend for their longevity upon proper storage conditions. (1) See also *durability.*

permanent paper. Paper that is chemically stable, that is, resistant to deterioration caused either by internal chemical reactions or by environmental factors such as humidity and light, under normal conditions of storage and use. In practice, a minimum durability is often assumed or specified. Perhaps the most important factors in permanence are an alkaline pH and an alkaline reserve; but papers made by very stable fibers such as cotton can last for centuries even at a slightly acidic pH. (4) The American standard for permanent paper, published as ANSI Z39.48-1992(R1997), specifies that permanent paper should last at least several hundred years without significant deterioration under normal library use and storage conditions. (3)

pH. Measure of the hydrogen ion concentration in a solution, which indicates the extent to which the solution is acidic or alkaline. The pH scale ranges from 0 to 14, with 7.0 being the point of neutrality. Numbers below 7.0 signify increasing acidity, while numbers ranging above 7.0 signify increasing alkalinity. The scale is logarithmic; thus each whole number increase or decrease represents a tenfold change. (7) See also *acid free, alkali.*

Photographic Activity Test (PAT). ISO 14523:1999 (formerly ANSI IT9.16-1993) is a standardized test that uses fading, mottling, or staining detectors to evaluate whether enclosure materials, inks, and adhesives are safe to use with silver photographic images.

plasticizer. Chemical added to a thermoplastic (or sometimes to a thermoset) resin to increase its workability, flexibility, or distensibility. It can also lower the melt viscosity, glass transition temperature, or elastic modulus. Plasticizers are usually high molecular

weight organic liquids or low melting solids. Common plasticizers are esters of dicarboxilic acid or of phosphoric acid, and can be present in large amounts (in the case of PVC, particularly). Other plasticizer types include hydrocarbons, halogenated hydrocarbons, ethers, polyesters, polyglycols, and sulfonamides. Some (such as dioctyl phthalate in PVC) tend to migrate to the surface, making it oily or sticky, or to other adjoining materials. (5,8)

ply. (1) One of the sheets that are laminated to build up a pasted board of a given thickness. (2) One of the separate layers that make up a multilayer aggregate such as multi-ply tissues. (4)

point. A measure of thickness equal to one thousandth of an inch. See also *mil; thickness.*

polyester. A polymer characterized by the presence of carboxylate esters in the repeat units of their main chains. Most polyesters are made with terephthalic acid or its derivatives. Polyesters are often made in the melt phase with solid starting materials, yielding a product with very little off-gassing. (5,8) A generic name for a type of plastic consisting of hydrocarbon chains linked by an ester. Polyester can be formed into woven and nonwoven fabrics, fiber batting, sheets, or film.

Polyethylene terephthalate (PET) is a specific polyester that is chemically stable, transparent, and colorless; it has high tensile strength. It is commonly used in preservation in sheet form for encapsulation and to make folders, book jackets, and other protective enclosures. When polyethylene is free of coatings and additives, it is chemically stable. It has several forms with different properties (density, transparency, flexibility, tensile strength). Examples of uses in preservation are translucent flexible sheets for sleeves and bags; foam sheeting for cushioning boxes; and spunbonded fiber for envelopes and wrapping. (3)

polypropylene. A very common plastic, due to a low monomer cost and high efficiency of polymerization and processing (compared with other thermoplastics). Polypropylene is easily processed and easily modified. Hindered phenols (such as BHT) are common antioxidants, particularly for products that will be exposed to light. Copolymerization with polyethylene yields a variety of properties, from rigid to impact resistant to rubbery. It can also be copolymerized with unsaturated hydrocarbons (such as butene). (5,8)

polyvinyl acetate (PVA). A colorless transparent plastic made from vinyl acetate. Commonly used in adhesives, which themselves are also referred to as PVA. Some PVA adhesives are suitable for use in conservation because of their greater chemical stability and good working characteristics. (3)

polyvinyl chloride. A plastic that has been manufactured in the United States since the 1930s. It is not as chemically stable as some other plastics, since it can emit hydrochloric acid (which in turn can damage library materials) as it deteriorates. It therefore has limited application in the preservation of books and paper. Some plastics called vinyl may, in fact, be polyvinyl chloride. (3)

post-consumer waste (recycled pulp). Any paper product that has gone through its useful life and been discarded by the user and can be used for recycled pulp. Waste or scrap created in a manufacturing or converting operations is not considered post-consumer waste and can also be considered recycled. (4)

preservation. Activities associated with maintaining library, archival, or museum materials for use, either in their original physical form or in some other format. "Preservation" is considered a broader term than "conservation." See also *conservation.* (1)

pressboard. A tough, dense, highly glazed paperboard, used where strength and stiffness are required of a relatively thin (e.g., .030 inch [0.7620 mm]) board. It is almost as hard as a sheet of fiberboard, and is commonly used for the covers of notebooks. See also *solid board.* (1)

pyroxylin-treated book cloth. A cotton fabric completely and (usually) heavily coated with the cellulose nitrate compound, pyroxylin, or a fabric completely filled with the same compound. Because of the pollution generated during manufacture, pyroxylin cloth is gradually being replaced by acrylic-coated cloths. (3) Pyroxylin-treated cloths have been shown to embrittle and cause discoloration of adjacent material.

recycled pulp. Paper fiber reclaimed from recovered material and reused. (4)

sizing/sized. The addition of materials to a papermaking furnish or the application of materials to the surface of paper and board to provide resistance to liquid penetration and, in the case of surface sizing, to effect one or more of these properties: water resistance, abrasion resistance, abrasiveness, creasability, finish, smoothness, surface bonding strength, printability, and the decrease of porosity and surface fuzz. (4) Common sizes are alkaline, gelatin, and alum rosin size.

solid board. A paperboard made of the same material throughout as contrasted with a combination board where two or more stocks are used. A pasted board is not a solid board even though the same stock is used. (4) See also *pressboard, fiberboard.*

stability. See *chemical stability.*

starch. A white, odorless carbohydrate found in various plants. When extracted and purified, primarily from tapioca, corn, potatoes and wheat, it is used in paper as an adhesive. (4)

stiffness. The ability to resist deformation under stress. (4)

strength retention. The retention of significant use properties over prolonged periods. The probable permanence of paper is usually estimated by accelerated oven-aging test and evaluated by performing standardized tests before and after aging. Folding endurance, tear resistance, tensile strength, and pH are common tests used to evaluate strength retention. See also *permanent paper.*

tearing resistance. The force required to tear a specimen under standardized conditions. Two methods of measurement are in common use: (a) Internal tearing resistance, wherein the edge of the specimen is cut before the actual test; and (b) edge-tearing resistance. (4)

text finish. A finish intermediate between antique and machine finish. It is closely akin to vellum finish. (4)

text paper. A paper of fine quality and texture for printing. Text papers are manufactured in white and colors from bleached chemical woodpulp or cotton fiber content furnishes. They have a deckled or plain edge and are sometimes watermarked. They are made in a wide variety of finishes, including antique, vellum, and patterned surfaces. Common basis weights are 60, 70, and 80 pounds or heavier. (4)

thickness. Also called caliper, it is the space between opposite surfaces of paper. (4) Thickness is expressed in millimeters (mm) or thousands of an inch (mils). Other measures of paper thickness include: points, where 1 pt. = .001 inch, and plies which are usually associated with mat board. See also *point* and *mil.*

vellum. A strong, high-grade natural or cream-colored paper made to resemble the fine parchment originally made from calf skin. (2) A term applied to a finish rather than a grade. (3) Tracing papers, both natural and those rendered transparent by suitable treatment. (4)

vellum finish. A finish similar to eggshell, usually produced on a paper made from a harder stock than eggshell book paper. The surface is more finely grained than in eggshell finish. It is produced by special felts on the presses. (4)

watermark. Image or symbol formed in a sheet of paper, visible when the paper is held up to transmitted light. In handmade paper, the watermark forms as fewer fibers settle over a raised area woven into the mold, resulting in a greater translucency of the sheet in that area. Watermarks are simulated in machine-made paper by a device known as a dandy roll that impresses a design in the wet mat of fibers. (7)

wove. Wove papers are those that do not exhibit the wire marks known as laid lines. They are made with a woven wire mould if handmade, and if machine-made, by means of a dandy roll with a wove cover or without a dandy roll at all. Wove papers, only made since 1755, were called “vellum” by the inventor. (6)

4. Data Elements for Materials Used in Preservation Products

The following specifications list the most common materials used in preservation products, their applications, and the data elements that are desirable when describing these products.

4.1 Paper

4.1.1 Scope

Paper and paper-stock-based products used to store (house), bind, or repair library materials.

4.1.2 Applications

Applications include repair papers, handmade papers, mouldmade papers, copy papers, lining papers, interleaving papers, tissue papers, blotters, storage envelopes, or other papers used in preservation applications. The extra data elements that relate to card (board) (0.006 inch [0.1524 mm] thick or more) and paperboard (0.012 inch [0.3048 mm] or more in thickness) are addressed in Section 4.2.

4.1.3 Data Elements

Include from the following list those elements that apply to the product for the intended use.

(1) Proprietary name

(2) Manufacturer and/or vendor

(3) Composition

(a) Fiber type: cotton, chemical wood pulp, groundwood pulp, and other. Include percentage of various types of fiber in the composition when possible. Include percentage of recycled pulp and identify if post-consumer waste when applicable.

(b) Alkaline reserve: percentage, type, and pH

(c) Lignin content: degree of delignification expressed as kappa number (TAPPI T236) or positive/negative response to a floroglucinol spot test for lignin.

(d) Sizing: alkaline, gelatin, alum rosin, etc.

(e) Additives: fillers, coatings, optical brighteners, etc.

(4) Description

(a) Grade: bond, coated, handmade, laid, mouldmade, text, wove, etc.

(b) Finish: machine finish (antique, calendered, eggshell, vellum); embossed finish (linen, etc.)

(c) Basis weight (TAPPI T410)

(d) Caliper (TAPPI 411)

(e) Grain direction

(f) Dimensions

(g) Color

(h) Opacity (TAPPI T425)

(i) Identification: watermark, embossing, or other markings

(5) Performance

(a) Chemical stability (meets ANSI/NISO Z39.48, ASTM D3290, ISO 9706, ISO 11108, or NEN 2728 permanent/durable paper standards)

(b) Strength (folding endurance, TAPPI 511; tearing resistance, TAPPI T414)

(c) Water resistance (TAPPI 433)

(d) Smoothness (TAPPI 538)

(e) Stiffness (TAPPI T489)

(f) Abrasion resistance (TAPPI T476)

(g) Light sensitivity or color fastness (evaluated as brightness which is measured before and after exposure to light, TAPPI T452)

(h) Color: bleeding (possible test method: must show no bleeding when soaked in distilled water for 48 hours while held in contact with white bond paper)

(i) Photographic Activity Test (ISO 14523)

(j) Strength retention after artificial aging (NEN 2728)

4.2 Paperboard and Card(board)

4.2.1 Scope

Solid board, pressboard, fiberboard, or corrugated board used for binding, protective enclosures, storage, and repair of library materials. Card(board) 0.006 inch (0.1524 mm) and paperboard 0.012 inch (0.3048 mm) thick or more.

4.2.2 Applications

Applications include book cover boards, pamphlet covers, rare book boxes, phase boxes, wrap-arounds, portfolios, storage boxes (record storage, document, artifact, film, etc.), folders (map, file, etc.), drawer liners, mat boards.

4.2.3 Data Elements

Include from the following list those elements that apply to the product for the intended use.

(1) Proprietary name

(2) Manufacturer or vendor

(3) Composition

- (a) Paper: see 4.1.3 (3)
- (b) Noncellulose layers: identify materials
- (c) Adhesives: see 4.5.3(3)

(4) Description

- (a) Paper: see 4.1.3 (4)
- (b) Number of plies
- (c) Grain or flute direction

(5) Performance

- (a) Paper: see 4.1.3 (5)
- (b) Chemical stability (meets ASTM D3301)
- (c) Bursting strength (TAPPI T807 and T810)

4.3 Cloth

4.3.1 Scope

Woven material used in bookbinding, book repair, and in storage containers and other products manufactured for the storage of library materials.

4.3.2 Applications

Cloths are used in libraries in two ways: as raw materials for binding and repair, and as part of pre-made products. In binding and repair cloth is used to cover books and boxes,

and to reinforce spines and hinges. Examples of pre-made products that include cloth are: portfolio boxes, carrying cases, pamphlet boxes, albums and binders for scrapbooks and photographs, and enclosures for audiovisual material. Cloth is also used as spine and hinging material for pamphlet binders and enclosures.

4.3.3 Data Elements

Include from the following list those elements that apply to the product for the intended use.

(1) Proprietary name

(2) Manufacturer or vendor

(3) Composition

- (a) Base fabric: fiber content, including the percentage of each fiber type (i.e., 50/50 polyester/cotton, etc.)
- (b) Treatment of fabric: bleached, unbleached
- (c) Additives: sizings, fillers
- (d) Surface coatings: coating material (pyroxylin, acrylic, starch) and method of application (impregnated, filled, coated)
- (e) Backing if lined: backing material and adhesive
- (f) Adhesive, if pre-glued

(4) Description

- (a) Type: cambric, linen, canvas. Book cloths and buckrams that are used in the bookbinding industry can follow classifications of ANSI L29.1-1977, Fabrics for Book Covers.
- (b) Width in inches and/or centimeters
- (c) Color
- (d) Thread count (number of threads per inch, both warp and weft)
- (e) Weight/thickness

(5) Performance. Tests are described in ANSI L29.1-1977, Fabrics for Book Covers.

- (a) Colorfastness to light
- (b) Resistance to water spotting
- (c) Abrasion resistance
- (d) Breaking strength
- (e) Tear strength

4.4 Plastics

4.4.1 Scope

Plastics used in the manufacture of products used to store, rehouse, bind, or repair library materials.

4.4.2 Applications

Plastics are used in libraries and archives for sleeves, envelopes, custom-fitted book boxes, record jackets, secondary support material, mounts and holders for photographs, injection molded containers, frames, exhibit supports and cases, vapor and gas barriers, and as corrugated board for a variety of housing and storage applications.

4.4.3 Data Elements

Include from the following list those elements that apply to the product for the intended use.

(1) Proprietary name

(2) Manufacturer and/or vendor

(3) Composition

- (a) Chemical name (e.g., polyester, polyethylene, polypropylene, acrylic, etc.)
- (b) Method of manufacture
- (c) Additives (e.g., BHT, etc.)
- (d) Coatings (e.g., coloring agents, UV inhibitors, reflective coatings, antistatic coatings, etc.)
- (e) Adhesives (including adhesive type, e.g., acrylic, starch, gelatin, and method of adhesion, e.g., pressure-sensitive, heat-activated, water soluble.)
- (f) Lubricants (e.g., silicone coating, etc.)
- (g) Plasticizers
- (h) Other (chemical foaming agents, antioxidants, antistatic agents, fire retardant additives, etc.)

(4) Description

- (a) Dimensions (e.g., color, thickness, height, weight, etc.)
- (b) Opacity

(5) Performance

- (a) Tear resistance
- (b) Impact resistance
- (c) Heat resistance
- (d) Scratch resistance
- (e) Light sensitivity
- (f) Lightfastness
- (g) Moisture permeability
- (h) Gas/vapor permeability

4.5 Adhesives

4.5.1 Scope

Adhesives used in products used to store (house), bind, or repair library materials.

4.5.2 Applications

Adhesives are used in libraries and archives to mend paper tears and bindings, hinge mat boards, and construct protective housings. Adhesives are also found in pressure-sensitive and heat- and water-activated tapes, in mounting tissues, and as an additive for laminating plies of matboard or other board.

4.5.3 Data Elements

Include from the following list those elements which apply to the product for the intended use.

(1) Proprietary name

(2) Manufacturer and/or vendor

(3) Composition

- (a) Chemical name (e.g., methyl cellulose, hydroxypropyl cellulose, polyvinyl acetate, starch, gelatin, etc.)
- (b) Additives (plasticizers, stabilizers, inhibitors, etc.)

(4) Description

- (a) Molecular weight
- (b) Viscosity in centipoise (cps)
- (c) Solubility (i.e., water soluble, solvent soluble)
- (d) Color
- (e) pH
- (f) Form (e.g., liquid, powder, pressure-sensitive, heat-activated, etc.)
- (g) Opacity
- (h) Additives

(5) Performance

- (a) Aging characteristics
- (b) Drying time
- (c) Strength
- (d) Shelf life
- (e) Storage conditions
- (f) Elasticity

4.6 Paper and/or Board Composite Products

4.6.1 Scope

Composite products made from paper, paper-stock-based products, and other elements used to store, house, bind, or repair library materials.

4.6.2 Applications

Storage envelopes, boxes and containers, enclosures, pamphlet binders, labels, etc.

4.6.3 Data Elements

Include from the following list those elements that apply to the product for the intended use.

(1) Proprietary name

(2) Manufacturer or vendor

(3) Composition

- (a) Paper: See 4.1.3 (3)
- (b) Board: See 4.2.3 (3)
- (c) Cloth: See 4.3.3 (3)
- (d) Plastics: See 4.4.3 (3)
- (e) Composition of the various plies if made of different stock
- (f) Adhesives: identify the type. See 4.5.3 (3)
- (g) Other materials: identify and describe nonpaper materials used to compose the object such as buttons, strings, metal corner reinforcements

(4) Description

- (a) Paper: See 4.1.3 (4)
- (b) Board: See 4.2.3 (4)
- (c) Cloth: See 4.3.3 (4)
- (d. Plastic: See 4.4.3 (4)
- (e) Closure type: slot, flap, etc.
- (f) Construction of enclosure or container: as pertinent, such as direction of opening, thumbcut holes, cutouts, seam position, etc.
- (g) Dimensions: include inner dimensions if applicable

(5) Performance

- (a) Paper: See 4.1.3 (5)
- (b) Board: See 4.2.3 (5)

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Appendix A

Referenced Standards and Tests

(This appendix is part of the American National Standard Guidelines for Information About Preservation Products, ANSI/NISO Z39.77-2000.)

1. Standards

1.1 American National Standards Institute (ANSI)

ANSI L29.1-1977. Fabrics for Book Covers.

1.2 American Society for Testing and Materials (ASTM)

ASTM D3301-00. Standard Specification for File Folders for Storage of Permanent Records.

ASTM D3290-01. Standard Specification for Bond and Ledger Papers for Permanent Records.

ASTM D4727/D4727M-98. Standard Specification for Corrugated and Solid Fiberboard Sheet Stock (Container Grade) and Cut Shapes.

ASTM D4826-88(1997). Standard Practice for Units of Measurement and Conversion Factors for Pulp, Paper, and Paperboard.

1.3 International Organization for Standardization (ISO)

ISO 9706: 1994. Information and documentation - Paper for documents - Requirements for permanence.

ISO 11108:1996. Information and documentation - Archival paper - Requirements for permanence and durability.

ISO 14523: 1999. Photography - Processed photographic materials - Photographic activity test for enclosure materials.

1.4 National Information Standards Organization (NISO)

ANSI/NISO Z39.48-1992(1997). Permanence of Paper for Publications and Documents in Libraries and Archives.

ANSI/NISO Z39.66-1992(R1998). Durable Hardcover Binding for Books.

ANSI/NISO/LBI Z39.78-2000. Library Binding.

1.5 Netherlands Normalization (NEN)

NEN 2728. Permanent Paper — Requirements and Test Methods.

2. Tests

2.1 Standard Tests

ASTM D1030-95(1999). Standard test method for fiber analysis of paper and paperboard.

ASTM D4988-96. Standard test method for determination of alkalinity of paper as calcium carbonate (alkaline reserve of paper).

2.2 Technical Association of the Pulp and Paper Industry (TAPPI) Tests

T236. Kappa number of pulp.

T266. Determination of Sodium, Calcium, Copper, Iron and Manganese in Pulp and Paper by Atomic Absorption Spectroscopy.

T401. Fiber Analysis of Paper and Paperboard.

T406. Reducible Sulfur in Paper and Paperboard.

T410. Grammage of Paper, Paperboard, and Combined Board.

T411. Thickness (Caliper) of Paper and Paperboard.

T414. Internal Tearing Resistance of Paper.

T425. Opacity of Paper.

T433. Water Resistance of Sized Paper and Paperboard.

T435 and T509. Hydrogen Ion Concentration (pH) of Paper Extracts.

T452. Brightness of Pulp, Paper, and Paperboard.

T476. Abrasion Loss of Paper and Paperboard.

T489. Stiffness of Paper and Paperboard.

T511. Folding Endurance of Paper.

T538 or UM-518. Roughness of Paper and Paperboard.

T807. Bursting Strength of Paper and Linerboard.

T810. Bursting Strength of Corrugated and Solid Fiberboard.

2.3 Trade Standards

Manufacturers of Binders Board. Manufacturing Standard and Specifications for Binders Board, 1975.

U.S. Commercial Standard 50-34, Binders Board for Bookbinding and Other Purposes.

3. Specifications

3.1 National Archives and Records Administration

Specifications for an Acid-Free Archives Box. 1991.

Specification for a Low Lignin Archives Box. 1991.

Specifications for Letter and Legal Size File Folders. 1991.

3.2 Library of Congress

Specification for Paper Stock for the Storage of Artifacts. #100-100, 1997.

Specification for Buffered Card Stock for the Storage of Artifacts. #200-200, 1997.

Specification for Buffered Board Stock for the Storage of Artifacts. #300-300, 1997.

Specification for Document Storage Box, #300-311, 1997.