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Conseil canadien des archives**

INFORMATION BULLETIN

Archival Enclosures: Preservation Glossary

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A

abrasion resistance—a standard TAPPI Test (T476) which measures the resistance of a paper to the abrasion of a rotating wheel by weighing the sample before and after the test. Results are given as a percentage of total weight lost to abrasion.

acetic acid—see **vinegar syndrome**.

acid-free paper—papers which contain no free acids and have a pH value of 7.0 or greater. These papers may be produced from virtually any fibre which does not contain active acids, or from which active acids have been eliminated from the pulp during manufacture of the paper. However, residual bleach from processing, the presence of alum rosin sizing, or exposure to atmospheric pollutants, may lead to the formation of acids in the paper unless the paper is also buffered with an alkaline substance capable of neutralizing the acid.

adsorbents—materials such as activated carbon which can adsorb or accumulate substances onto their surface, usually gaseous or liquid impurities, or pollutants. See **MicroChamber**

albumen photographs or prints—a 19th-century, photographic process based on the use of egg white (albumen) to hold the silver halides or image-forming materials. It was widely used between 1855 and 1895, after which the gelatin print became predominant. Albumen prints are characterized by a thin base paper, brown to purple shadows, eggshell highlights, and a fine craquelure in the emulsion.

alkaline filler—See **alkaline reserve**.

alkaline reserve—also buffer or alkaline filler; usually a mineral compound such as calcium carbonate which is put into paper to neutralize any acids that might be generated during the ageing of the paper or adsorbed from the surrounding environment. Specifications commonly call for a reserve of 2% to 3% calcium carbonate. Papers with an alkaline reserve usually have a pH of 7.5 - 9.5.

alum rosin size—See **size**.

antioxidant—a chemical additive used to prevent oxidation of a material.

aperture card—a processable card of standard dimensions with one or more openings into which a microfilm frame or frames can be mounted or inserted.

'archival' adhesive—those adhesives which are chemically and physically stable and do not have an adverse effect on archival documents; for example: methyl cellulose, but not pressure-sensitive, rubber-based, or ether-based adhesives.

'archival' paper—paper of the highest permanence and durability; paper having a high resistance to ageing and intended for documents which have to be stored for a long time. The materials and characteristics of archival paper 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 and the Canadian General Standard Board – CGSB 9.7-2000.

B

basis weight—the weight of a sheet of paper in grams per square metre. It may also be expressed as pounds of a ream of 500 sheets of a given size. Since sheet sizes are not the same for all kinds of paper, metric is the preferred measuring system. Solid-core box boards have approximately twice the basis weight of corrugated materials.

bond—a grade of writing or printing paper which historically was used where permanence, strength, and durability were required. Now, bond papers cover a much wider spectrum of quality and are used for letterheads and forms, and situations where permanence and durability are less important than aesthetic considerations and printability.

box board—See **solid fibre board**.

buffers—See **alkaline reserve**.

Bursting Strength (Mullen test) a test designed to measure the bursting strength of papers to certain limits after which the stronger Beach puncture resistance test is required. Units for the Mullen test are pounds per square inch (PSI), or kilopascals (KPa)—where a pascal is a force (newton) per unit area (N/m^2). The Beach test is measured in Joules (where $1\text{J} = 1\text{m}\cdot\text{N}$)

C

calcium carbonate—an alkaline mineral added to paper pulp as a buffer. See also **alkaline reserve**.

calendered—one of a number of possible surface treatments for paper. See also **finish**.

caliper—See **thickness**.

cellulose acetate—a non-flammable plastic made by reacting cellulose (in the form of cotton or wood fibres) with acetic acid. This group of films, including diacetate and triacetate—the "safety films," which replaced nitrate film—were later developments in the plastic film industry. Although slower to deteriorate, they are still subject to a mild catalytic reaction that results in the "vinegar syndrome."

cellulose nitrate—a compound made by treating cellulose with nitric and sulphuric acids. The resulting plastic was much used as a film base between the early 1920s and the 1950s. Because of its unstable nature, nitrate film must be carefully stored in cool dry conditions. Once the material begins to decompose, a rapid catalytic reaction sets in and the film quickly breaks down chemically, producing sticky, brown, powdery, fibrous gobs. The reaction is exothermic and can produce a fire or explosion if motion picture film is tightly packed and sealed. To preserve the film, the film must be copied (or frozen for later copying) at the first sign of deterioration.

chemical wood pulp—See **pulp**.

chromium-dioxide (CrO₂) tape—a variety of audio tape which has had major stability problems and should be avoided until the problems are rectified.

coated paper—a paper to which one or more layers of a coating slip have been applied. A slip is a liquid suspension containing pigments (usually white) and a binder or adhesive, as well as other additives such as colouring matter, dispersants, and viscosity modifiers. The slip or coating alters the surface of the sheet to suit specific requirements—e.g., for printing.

Cobb Size Test – is a measure of water absorption of a hard-sized sample of paper or board. Figures are given as grams of water absorbed per square metre of stock. The test can be seen as an indication of water repellency.

cockle—a local deformation of a sheet of paper due to unequal shrinkage, giving it a slightly wavy appearance.

co-polymer polymers made up of more than one monomer (i.e. Coroplast is made up from two monomers: polypropylene and polyethylene).

Coroplast - polypropylene and polyethylene plastic in the form of a corrugated board.

corrugated card—board consisting of one or more sheets of fluted paper (corrugations) stuck to one sheet or between two or three sheets of flat paper. Corrugated card is normally available as single face (one facing and one fluted layer), single wall or double face (one fluted layer between two facing layers) and double wall (two fluted layers and three facing layers). The fluted layers are also available in different sizes: A-flute, B-flute (normal card), C-flute, and E-flute (smallest size).

cross direction—the direction in the plane of the paper that is at right angles to the machine direction. This is usually the weaker direction. See also **machine direction**.

D

density—or weight per unit volume is expressed in g/cm³. Greater density of paper board seems to correlate well with better performance in most physical tests.

dimensional stability—ability of a paper or board to retain its dimensions and its shape during changes in moisture content; for example, variations in the physical and mechanical stresses during printing and converting operations or during use.

durability—the ability of a paper to resist the effects of wear and tear in performance situations. For example, paper currency should be durable but need not be permanent.

E

edge welding—a method of heat welding Mylar for encapsulation or envelope manufacture.

E-flute—See **corrugated card**

environmental conditions—usually stated as the temperature and relative humidity in a building. Recommended environmental levels for an archive with a predominantly paper collection are 18°- 20°C and 45% RH.

F

ferrotyping—a photographic procedure in which the print is dried with its emulsion against the surface of a polished metal plate to create a glossy surface. The term is also used when this effect is inadvertently created—for example, when a print becomes partially glossy due to contact in storage with a glossy surface. This usually occurs under conditions of high relative humidity.

fibre—a hollow tubular cell that gives strength and support to plant tissue. The walls of plant fibres are largely composed of cellulose.

fibre composition—the fibrous constituents of a paper or board and their proportions in it. The fibre composition is usually expressed as a percentage of the total mass of fibrous material.

filler—(loading) fine mineral pigments, usually white, such as clay, titanium dioxide and calcium carbonate that are added to the fibre furnish or stock of the paper. Among other things they affect the pH, surface finish, and printability of a paper.

finish—surface characteristics, such as smoothness, imparted to paper or board by mechanical means. A number of terms will come up in various specifications: hot-rolled, plate-finished, water-polished, machine-finished, calendered.

flexural modulus—The number of flex cycles that a material is capable of withstanding before failure.

fluting—see **corrugated card**.

Fold Endurance represents the number of double folds that a paper or card can withstand before breaking. (TAPPI, T-511)

freezer pouch heat sealable enclosures designed for use in cold storage systems. These enclosures are comprised of a four layer laminate of paper, polyethylene, foil and polyethylene.

furnish—the raw materials placed in a beater for making pulp; the stock.

G

glassine—a chemical pulp paper made by dampening and supercalendering grease-proof paper. It is very smooth and glossy on both sides and naturally translucent. Archival glassine should be specified as being acid-free.

grain direction—See **machine direction**.

grammage—the mass of a unit area of paper or board determined by a standard test method and usually expressed in grams per square metre.

ground wood—a mechanical pulp made by grinding wood against an abrasive surface to separate the fibres, without any chemical cooking. Such pulp contains many substances that are deleterious to the permanence of paper, notably lignin and hemicellulose.

H

high alpha cellulose virgin pulp—a high-quality, chemical pulp containing no recycled material or other impurities.

high usage—this grade of paper or folder stock should have a high level of mechanical strength—for example, in fold endurance. See also **durability**.

homopolymer - polymer made up of repeating units of one type of molecule, or monomer.

K

kappa number—a unit of measurement of lignin content. 5 kappa = 1 %.

knots—similar to shives.

kraft paper—from the German "strong." A type of paper made from softwood, unbleached, sulphate pulp. It has a higher level of mechanical strength than other pulping processes using the same wood fibres. Often synonymous with sulphate pulp.

L

ledger papers—a type of paper characterized by high strength, high tearing resistance, water and ink resistance, uniformity of surface, and smoothness. Originally, ledger paper was used especially for pen and ink records. Most ledger papers are surface-sized. They frequently are subjected to appreciable wear and must have a high degree of permanence and durability.

legal size—8 1/2" x 14"

letter size—8 1/2" x 11"

lignin—one of the three main constituents of wood pulp; the others are cellulose and hemicellulose. Lignin is an unstable component of wood pulp whose removal enhances the strength and permanence of paper. Currently all permanent papers specify the removal of lignin to <1%. However, recent research suggests that an alkaline buffered pulp containing some lignin may not be detrimental to the permanence of paper, although the strength of the paper will be reduced.

M

machine readable data carriers—any media requiring electronic means to decipher its information— all magnetic tapes, CDs, records, computer disks etc.

machine direction—the direction in which the paper comes off the machine during manufacture. Since most fibres are oriented lengthwise, this becomes the strong direction of the material. (Compare to the cross or weak direction of the material.)

magnesium carbonate—a mineral, like calcium carbonate, used to create an alkaline reserve in paper.

magnetic media—those media using magnetic particles embedded in a carrier, adhered to a base film (usually polyester) and requiring electronic means to interpret the signal— e.g., audio and video tape, computer disks, dictaphone tapes etc.

mat board—a multi-ply solid paper board used to display works of art on paper.

maximum permanence—a life expectancy of several hundred years. See also **permanence**.

metal edge stays—the metal strips usually found on document storage boxes to hold the box together.

MicroChamber—the trade name of a new group of papers and boards produced by Conservation Resources International Inc., which contain layers of activated carbon intended to adsorb pollutants given off by documents or from the surrounding environment.

mill board—a generic term for a homogeneous board usually made from mixed waste paper.

Mullen See **bursting strength**.

Mylar—the trade name of a polyethylene terephthalate (PET) sheet material, Mylar Type D, produced by Dupont until 2001, regularly used for archival envelopes, encapsulation etc. The Dupont product name is Melinex 516.

N

Newton rings—an interference pattern often produced when two glossy materials are in close

contact—e.g., a photo negative in a plastic envelope.

O

optical brightening or fluorescent whitening—incorporation in a pulpstock, surface sizing, or coating of an almost colourless substance that can convert ultraviolet radiation into visible light making an apparent improvement in the whiteness of the paper or board.

P

paper—a generic term for a range of materials in the form of a coherent sheet or web. Paper is made by depositing vegetable, mineral, animal, or synthetic fibres, or their mixtures, in a fluid suspension onto a suitable forming device, with or without the addition of other substances. The fibres may be coated, impregnated or otherwise converted, during or after manufacture, without necessarily losing their identity as paper. In conventional papermaking processes, the fluid medium is water, although new developments include the use of air and other fluids.

paperboard—a generic term usually applied to a paper sheet of more than 225 g/m².

permanence—the ability of a paper to resist changes over long periods of time, without significant deterioration, under normal use and storage conditions. Permanence is affected by temperature, humidity, light, and the presence of chemical agents such as acids. It is estimated by accelerated oven-ageing tests or by tests under other specified conditions of temperature, light, and humidity. Permanence is given in three levels: medium (50 -100 years), high (over 100 years), and maximum (several hundred years).

peroxide—any of a class of reactive organic compounds whose molecules contain two oxygen atoms bound together.

pH—an expression of the acidity or alkalinity of a solution or material. A pH of 7 is neutral, lower numbers are acidic, and higher numbers are alkaline. The concentration of the free hydrogen ions is expressed as an exponent; therefore, pH 4 is 10 times more acidic than pH 5 and 100 times more acidic than pH 6. Permanent papers will have a pH of between 7.5 and 9.5.

phased boxes—developed by the Library of Congress to provide intermediate protection to materials waiting further treatment. They may be constructed in-house or purchased from archival suppliers in standard or custom sizes. Phased boxes reduce wear and tear from handling and protect artifacts from potentially damaging materials.

phloroglucinol test— a chemical spot test to identify papers containing >1% lignin.

Photographic Activity Test—developed by the Image Permanence Institute in Rochester, N.Y. to determine which types of enclosure materials, inks and adhesives are safe to use with silver photographic images. The P.A.T. requires the incubation of an enclosure material, adhesive or inked surface against

the surfaces of two sensitive detectors—one to highlight possible fading, the other possible staining of photographic materials. This is a pass/fail test and is a reasonable indicator of paper quality. Most archival suppliers regularly send samples of their various materials to IPI or other registered labs for testing. Products which have passed will be so advertised in the catalogues. Refined tests are currently being developed for colour and diazo materials.

plastics—modifications of naturally occurring, complex organic compounds or synthetic polymers, usually consisting of long chains of monomers that have been joined by polymerization. The complexity of plastic structures is increased by the addition of various additives such as plasticizers, lubricants, or anti-oxidants. See additional information under specific names of plastics.

plasticizers—solutes, which are normally glass-like, placed in such plastics as PVC to make them soft and pliable. Such materials are not chemically bound to the polymer and, over time, may come out of solution and appear on the surface of the plastic, from which they may evaporate or be rubbed off. Eventually plastics that are plasticized dry out, shrink and crack. However, other additives, such as oils, lubricants, antioxidants and cyanamides may also ooze out onto the surface of the plastic material.

plate-finished—See **finish**.

ply—a fibrous web of consistent composition formed on the wire of the paper or boardmaking machine. Several plies may be laminated together to form a board,—e.g., 4 ply mat board.

polycarbonate (PC)—a tough, clear UV-filtering plastic sheet which is safe for archival use — e.g., Lexan.

polyester—is a tough clear plastic sheet developed in the 1950s, and is suitable for archival use. Polyester has now largely replaced cellulose acetate in magnetic media and, to a lesser degree, in film. Trade name: Melinex 516.

polyethylene (PE)—plastic sheet used in envelopes and sleeves and suitable for archival use— e.g., Ethafoam, Tyvek.

polyethylene terephthalate (PET)—a clear, colourless, biaxially oriented, stressed, drawn plastic film. See also Mylar and polyester.

polypropylene (PP)—plastic sheet used in boxes, envelopes and sleeves and suitable for archival use.

pressure-sensitive—those adhesives requiring pressure for adhesion, such as "Scotch Tape."

polyvinylchloride (PVC)—a plastic sheet material NOT suitable for archival use due to the evaporation of plasticizers which cause the material to shrink and give off gases. This chemical degradation releases hydrochloric acid. PVC is particularly unsuitable for the storage of photographic materials such as slides.

ppm - parts per million

pulp—the mass of fibres, water and additives fed into a paper-making machine to create paper. The raw material or paper fibres are derived from various sources. Wood pulp, which is today the most common source, can be further subdivided into softwood (longer fibres) and hardwood (shorter fibres) pulp. Longer fibres equate to stronger paper. Other pulp materials are esparto grass, straw, bamboo, hemp, ramie, and of course rag pulp (see below).

Pulp is produced from the raw wood chip materials in a number of different ways. The simplest method produces ground wood or mechanical pulp. This method results in the largest volume of pulp for a given number of trees. It includes all impurities and therefore produces a low grade of paper such as newsprint.

Higher grades of paper are produced with a chemical pulp from which the non-cellulose materials have been removed. This is achieved by treating or cooking a slurry of wood chips in bisulphite liquor (sulphite pulp), monosulphite (neutral sulphite pulp), caustic soda and sodium sulphides (sulphate pulp), or caustic soda (soda pulp). Bleaching finally results in a relatively pure white pulp which then passes through the papermaking machine. The pulping technology will vary somewhat for the other non-wood fibres such as rag.

puncture resistance—see **bursting strength**.

Q

quire—the twentieth part of a ream, i.e. 25 sheets.

R

rag paper—a paper containing a substantial percentage of pulp made from textile cuttings or cotton linters, or directly from natural textile plants such as flax, hemp, ramie or cotton.

ream—a pack of 500 identical sheets of paper.

reducible sulphur—a sulphur compound which can affect photographic images and is capable of being "reduced" chemically. Specifications require 8 ppm. or .0008%.

Reemay—a spun bonded polyester fabric

relative humidity—the quantity of water vapour in the air, expressed as a percentage of the total water vapour that the air will hold at a given temperature. RH is the amount of water vapour in the air at a given temperature. Paper-based collections should be stored at 45% +/- 5%RH.

S

size—the addition of materials either to the stock (internal sizing) or to the surface of a paper or board (surface sizing), to increase surface strength and resistance to the penetration and spreading of aqueous

liquids—for example, writing ink. Alum rosin size is considered unacceptable for archival materials as it is acidic.

shives—coarse fragments of fibrous materials present in pulp or paper.

solid fibre board—also box board, board, solid-core board. A cardboard made of multiple layers of paper laminated together. A solid board as opposed to corrugated card.

standards and specifications—terms often used interchangeably. In this context a standard is a document published by a national or international body such as the ISO that specifies the materials and qualities of a product or process—for example, bond and ledger papers for permanent records. A specification will refer to a similar document published internally by an institution.

stiffness—of a paper board can be measured with a TAPPI Test (T-489). A sample is clamped in the apparatus and the bending moment is measured in gram centimetres (Taber units) when a load is applied to the free end of the sample. Equivalent SI units are millinewton metres (mN.m). The figures are usually quoted for the machine direction (m.d.) and the cross direction (c.d.).

surface finish—See **finish**.

T

tear resistance or strength—the average force (in grams or kg.) required to tear a single sheet of paper. Can be measured with TAPPI Test T-414. The SI units will be millinewtons (mN).

tensile yield strength—A measure of the ability of a material to withstand longitudinal stress (stretch) before it breaks.

thickness—also caliper; the distance between one surface of a paper or board and the other when a static load is applied and the measurement is taken with a micrometer. Thickness is expressed in millimetres (mm) or thousands of an inch (mils.) Other measures of paper thickness include: points—where 1 pt. = .001".

Plys (see above)—are usually associated with mat board. One ply is roughly equal to 500 microns.

Microns—are a measure of thickness usually reserved for plastic sheeting.

One micron = 1millionth of a metre.

trace metals—such as copper and iron can have a catalytic effect in the degradation of paper stock. Most specifications require < 30 ppm of iron and < 1 ppm of copper.

U

UL Flammability Rating—a standard test devised by the Underwriters Laboratory to measure the

flammability of a material.

V

vinegar syndrome—the term given to the deterioration of cellulose acetate film in which acetic acid is produced.

W

watermark—a localized displacement of fibres traditionally produced with a wire pattern or design fastened to the mould (screen). The slightly thinner paper of the design is then visible against a contrasting background.

Z

zinc oxide/carbonate—a mineral sometimes used as an alkaline reserve or buffer in place of calcium carbonate.

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