NEDCC
NORTHEAST DOCUMENT CONSERVATION CENTER

PHOTOGRAPHS

5.5 Storage Enclosures for Photographic Materials

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INTRODUCTION

Because storage enclosures for photographic prints and negatives are available in a variety of materials and formats (paper or plastic, folders, sleeves, or envelopes), choosing the proper enclosure requires an understanding of the alternatives. This leaflet reviews the various options available and discusses the advantages, disadvantages, and special precautions of each option.

Regardless of material or format, all enclosures used to house photographs should meet the specifications provided by the International Organization for Standardization (ISO). ISO Standard 18902:2013 and ISO 18916:2007 provide specifications on enclosure formats, papers, plastics, adhesives, and printing inks, and require that storage materials pass the Photographic Activity Test (PAT). (See the glossary at the end of this leaflet for helpful definitions).

Whichever enclosure is chosen, photographic prints and negatives should never be handled with bare hands. Skin oils and perspiration can damage emulsions, and cotton gloves can leave behind fibers, so nitrile gloves should be worn. In the absence of suitable gloves, wash your hands before handling photographic materials.

PAPER MATERIALS

The quality of pulp used in the manufacture of paper and board for storage materials is important for the preservation of photographs. Many modern papers are made from groundwood, which contains lignin, and these papers are easily degraded by heat and light. As they degrade, they produce harmful acids. Paper and board may also retain residual chemicals from the pulping process; sulfur and hydrogen peroxide can remain in the paper and be very damaging to all photographs.

With these concerns in mind, any paper product used for storage of photographs and negatives should be lignin-free and acid-free. Papers properly described as lignin-free are produced from cotton or linen (which contain no lignin) or from wood fibers that have had the lignin chemically removed. Enclosures constructed of paper in the neutral pH range (6.5–7.5) have no alkaline buffer. Buffered paper enclosures (pH 7.5–9.5) contain an alkaline material (such as calcium carbonate) that neutralizes acids as they form. Unbuffered paper enclosures are recommended for storage of color images, cyanotypes, and albumen prints due to their sensitivity to alkalinity.

Although the word is not easily quantifiable, the word "archival"—when used on its own—implies long-term storage and a chemically stable material. If a catalogue or product states that something is archival without any other information, it is wise to ask why the product is described in that way.

Alternatives to buffered paper and board are products which contain zeolites, such as MicroChamber or Artcare materials, both manufactured by Conservation Resources International. These papers and boards trap acids and gaseous pollutants, segregating them from the objects in the storage environment. Research by the Library of Congress and The Getty Conservation Institute has shown that papers and mat board with zeolites absorb and hold onto more pollutants than their buffered counterparts. Unfortunately, there is no way to know when the papers are "full," but in standard storage conditions, research conducted by Conservation Resources has shown a lifespan of up to 100 years.

Properly chosen paper enclosures and boards can also mitigate the destructive effects of pollutants and light on materials during exhibit. In an uncontrolled environment, they may be particularly beneficial—especially if the collection contains color photographs, nitrate film, or early safety film. For information on the nature of photographic film, see NEDCC Preservation Leaflet 5.1 "A Short Guide to Film Base Photographic Materials: Identification, Care and Duplication."

Glassine enclosures (see figure 1) are **not** recommended for the storage of photographs. Although acid-free and buffered, glassine is made with short groundwood pulp fibers and can contain additives to increase the flexibility and translucency of the paper but that become acidic over time.

Figure 1: Photograph stored in glassine enclosure (not recommended)

Labels such as acid-free, lignin-free, or buffered do not guarantee that a material is safe to use with photographs. Even these chemically stable papers may be harmful to the photographic image. The only way to be certain of the inertness of the paper is to purchase materials that have passed the Photographic Activity Test (PAT).

The PAT consists of two components: a test to detect image fading resulting from harmful chemicals in enclosures, and a test to detect staining reactions between enclosures and gelatin. As a general rule, suppliers will note in their catalog if a product has passed the PAT. If an item does not state that it has passed, it does not necessarily mean that it has failed; it may simply not have been tested. If there is no information on PAT results, purchase materials from suppliers familiar with the special needs of photographs. Choose enclosures that are acid free, lignin-free, or 100% rag and that are not highly colored.

Types of paper enclosures

Seamed Paper Envelopes. An envelope (see figure 2) is an enclosure with one open end; it may have a protective top flap. The seams in paper envelopes should be located at the sides and—if unavoidable—across the bottom. Any adhesives used in construction should be non-acidic and unreactive with silver. Most envelopes come with a thumb cut, but those without are preferred. Thumb-cuts allow air to touch the photograph, and encourage users to grasp the photograph and pull it from the sleeve. When using seamed paper envelopes, use a paper sling inside to aid in removing the photograph and to mitigate the effects of the seam.

Figure 2: Cabinet card stored in seamed paper envelope

Seamless Paper Envelopes. Also called a flour-flap enclosure, the seamless envelope does not have any adhesive. The envelope is formed with three or four flaps that fold over to produce a pocket. The fourth flap, if present, closes the envelope completely, protecting the object within from dust and dirt. The construction of this envelope encourages the user to place the object on a flat surface to open it, and it can accommodate thick objects. These characteristics make seamless paper envelopes ideal for thick, fragile items such as glass-plate negatives (see figure 3).

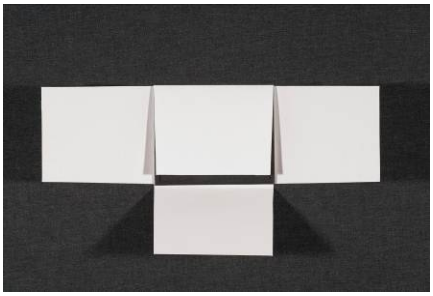

Figure 3: Four-flap enclosure for glass plate negative

Paper Folders. A folder is a sheet of paper that is folded in half. It is closed on one side only and must therefore be kept in a properly fitted box to hold the image effectively. If a paper folder is used for vertical storage in files, the photograph stored inside must be well supported to prevent sagging or curling. Folders are readily available in a variety of sizes and are simple to construct for large or mounted items.

ADVANTAGES OF PAPER ENCLOSURES

1. Paper enclosures are opaque, protecting the object from light.
2. Paper enclosures are porous, preventing the accumulation of moisture and detrimental gases.
3. Paper enclosures are generally less expensive than plastic enclosures.
4. Paper enclosures are easy to write on.

DISADVANTAGES OF PAPER ENCLOSURES

1. Paper envelopes make viewing difficult, requiring the removal of the object from the enclosure. This increases damage from handling, abrasion, and fingerprinting, especially in heavily used collections. If using paper enclosures, four-flap wrappers are preferred.

PLASTIC MATERIALS

Plastic enclosures of archival quality may be made of polyester, polypropylene, or polyethylene. They should not be coated or contain plasticizers or other additives.

Polyester is the most inert, dimensionally stable, and rigid of the three. It does have disadvantages, in that it can generate static electricity (which attracts dust) and it is expensive. Polyester enclosures should be free of any coatings or plasticizers.

Polypropylene is almost as rigid as polyester in the untreated polypropylene used in sleeve formats, but it is soft when it is the surface-treated polypropylene used for some ring-binder storage pages (see figure 7). Manufacturer specifications on the surface coatings of soft polypropylene products are proprietary information and not readily available, therefore this material cannot be properly evaluated or recommended.

Polyethylene is the most easily marred and least rigid of these plastics. High-density polyethylene (HDPE) is a translucent, milky plastic that is naturally slippery (see figure 4). Low-density polyethylene (LDPE), the clear polyethylene used in some ring-binder storage pages, has incorporated anti-block and anti-slip agents, which could be damaging for photographs.

Figure 4: Cabinet card stored in high-density polyethylene enclosure

Plastic enclosures made from **polyvinylchloride** (PVC) are unacceptable for archival photographic storage. This plastic, often referred to as vinyl by suppliers, is not chemically stable and will cause deterioration of a photograph over time.

Types of Plastic Enclosures

Plastic Envelopes. Plastic envelopes normally have heat-sealed seams, which eliminate any potential problem with adhesives. Both polyethylene and polyester envelopes are marketed by conservation product suppliers.

Plastic Folders. These may be successfully used in conjunction with paper envelopes. The polyester folder protecting the image from handling whenever it is removed from the paper envelope.

L-Velopes. Also called L-sleeves, these are a combination envelope-folder, being an envelope sealed on two adjacent sides. This allows for easy insertion and removal of objects, and provides more support than a folder. This design is particularly useful for smaller-format images (see figure 5 below).

Figure 5: Carte-de-visite housed in polyester L-sleeve

Plastic Sleeves. Often these sleeves are enclosures open at two opposite sides and are made from polyester or polypropylene. Usually, these sleeves are a one-piece construction with a self-locking fold on one edge (also called top-flap or fold-lock sleeves). This fold allows easy insertion and removal of the photograph with no abrasion to the image. However, when these sleeves are stored in groups, the folds can lock onto adjacent sleeves, making retrieval of the photographs difficult.

Figure 6: Cabinet card stored in polyester fold-lock sleeve

Polyester Encapsulation. Polyester encapsulation encloses a photograph between two sheets of polyester, sealed on all four sides with a heat welder or an ultrasonic welder. Sealing with double-sided tape is not recommended because of the risk that the adhesive will migrate from the carrier and stick to the photograph.

Encapsulation provides physical support and protection from the environment. It is useful for storing fragile prints, especially those that are torn. Encapsulation is not recommended for photographs adhered to chemically or physically unstable mounts or for contemporary color photographs. (The latter materials need exposure to air.)

Ring-Binder Storage Pages. These pages are made to fit three-ring binders with slipcases (see figure 7). They are available in a wide variety of formats, sizes, and materials, including polyester, polypropylene, and polyethylene. They are a functional alternative for small collections of uniform size that require frequent browsing.

Figure 7: Polypropylene three-ring binder storage page for 3 ½ "x 5" photographs.

Polyester Sheet/Matboard Folder. These folders are made of a sheet of polyester and a sheet of matboard of the same size, attached together along one long edge with double-sided tape. The matboard provides necessary support and the polyester allows the image to be easily viewed. These folders should be stored flat. They are particularly useful for storage of oversized photographs or photographs on rigid mounts. In time, these folders will probably need to be replaced or the double-sided tape will break down, releasing the polyester from the folder and possibly sticking to the object.

Polyester Sheet within a Paper Folder. This enclosure consists of a paper folder with a polyester sheet attached along an inner edge, opposite the centerfold. The attachment is made with double-sided tape. These folders are especially useful for small, fragile prints. The polyester holds the object in place and protects it from dirt and handling but allows for easy viewing and removal. The paper folder provides support to the image and protects it from light. However, over time the double-sided tape will release or the adhesive will flow out from under the carrier, necessitating folder replacement.

ADVANTAGES OF PLASTIC

1. Plastic enclosures have the great advantage of allowing an image to be viewed without being removed from the enclosure. This greatly reduces the chance of abrading, scratching, or fingerprinting the photograph, especially in heavily used collections.
2. Moisture and sulphides in the environment react with most photographs to hasten their deterioration. Plastic enclosures protect the object from the atmosphere.

DISADVANTAGES OF PLASTIC

1. Plastic enclosures can abrade and scratch photographs during insertion and removal. Matte or frosted surfaces are not recommended, as they are abrasive to emulsions. Low-density polyethylene also can cause problems with abrasion. Abrasion can be avoided by minimizing the removal of photographs from enclosures, using properly designed enclosures (such as self-locking sleeves), or using plastics that are naturally slippery (high-density polyethylene).
2. Plastic enclosures can trap moisture and cause ferrotyping (sticking with resulting shiny areas) of some images. This is particularly problematic in storage environments with high relative humidity or in the event of a collections emergency involving water. Surface treated polypropylene and low-density polyethylene are among the plastics more prone to ferrotyping.
3. Plastic enclosures can be difficult to write on unless a permanent, chemically stable ink such as Pigma ink is used.
4. Plastic enclosures can be flimsy and may require additional support, such as chemically stable Bristol board. (Bristol board is named for Bristol, England, where it was first produced.)
5. Plastic enclosures with low melting points (i.e. polyethylene) can melt during a fire, adhering themselves irreversibly to the materials stored inside them.

CONCLUSION

This preservation leaflet outlines many of the enclosures readily available for photographic storage. Each of these systems has its advantages and disadvantages. While each has been discussed individually, sometimes two enclosures can be combined into another, creating a hybrid format with its own characteristics. The final choice of enclosure will depend upon careful assessment of the particular needs of a collection and available funds, taking into consideration the materials to be preserved, usage patterns, best practice, institutional priorities, and the funds available. With proper storage, photographic materials can be preserved for future generations.

GLOSSARY

Acid Free – Acid-free or acid-neutral enclosures have a pH of 6.5 to 7.5 at the time of manufacture and will absorb a limited amount of acid before they themselves become acidic and begin to decay.

Archival – Although not quantifiable, the word "archival" implies long-term storage and a chemically stable material. If a catalog or product states that something is archival without any other information, ask why it is described that way.

Buffered – Buffered or alkaline-buffered enclosures contain an alkaline substance (the buffer) to raise the pH of the paper so it can absorb and/or neutralize a certain amount of acid. The pH of buffered papers is 8.5 or higher.

Lignin Free – Lignin-free paper is produced from cotton or linen, or other materials from which the lignin, a natural component of wood that darkens when exposed to light, has been chemically removed.

Molecular Trap or Sieve – A material that combines an alkaline buffer with either activated carbon or zeolites. These storage materials provide protection against environmental pollutants and by-products of deterioration not neutralized by alkaline buffers alone. Most commonly found under the MicroChamber name.

Photographic Activity Test (PAT) – The PAT is an international standard test (ISO18916) for evaluating photo-storage and display products and was developed by the Image Permanence Institute (IPI). Enclosures used for photographic materials must pass the PAT (this should be noted in the supplier catalog), and those that pass would be appropriate for other types of collection materials as well.

pH – The term pH is used to express acidity or alkalinity. It does not apply to plastics. The pH scale is logarithmic and runs from zero to 14, with 7 being neutral, below 7 being acidic, and above 7 being alkaline. For storage enclosures, a pH of 6.5 to 7.5 is considered neutral.

RESOURCES

Conservation Resources. "MicroChamber [technical information]."
http://conservationresources.com/Main/S%20CATALOG/MicroChamber.htm

International Organization for Standardization (ISO)

- ISO Standard 18902:2013. This standard specifies the principal physical and chemical requirements for album, storage, and framing materials to prevent damage to processed or printed imaging materials over time.
- ISO 18916:2007. This standard, reviewed and confirmed in 2015, specifies the procedure for the photographic activity and dye coupler reactivity tests.

Library of Congress, Preservation Research and Testing Division. "Performance Evaluation of 4-Ply Rag Boards Containing Calcium Carbonate and Zeolites." 2012. http://www.loc.gov/preservation/scientists/projects/NB%20Zeolite%20Report.pdf

NEDCC Preservation Leaflet 5.1 "A Short Guide to Film Base Photographic Materials: Identification, Care and Duplication." https://www.nedcc.org/free-resources/preservation-leaflets/5.-photographs/5.1-a-short-guide-to-film-base-photographic-materials-identification,-care,-and-duplication

Polyester encapsulation equipment

- Polyester Sealer from Museum Services Corporation http://www.museumservicescorporation.com/ecat/1000.html
- Polyester Sealing Machines from Preservation Equipment Ltd. https://www.preservationequipment.com/Catalogue/Equipment-Tools/Polyester-Sealing-Machines
- Polyweld Polyester Sealing Machine from Conservation Resources http://conservationresources.com/Main/section_17/section17_03.htm

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