Storage Containers, Supports, and Mounts

Introduction and Definitions

Using the appropriate containers, supports, and mounts, for the storage of cultural items is crucial to their preservation and is an important aspect of preventive care. Containers, supports, and mounts provide physical protection and support for items while they are in storage. Not all items require this protection, but those that do will benefit greatly from having it, and their useful life will be extended significantly.

Why Are Containers Important?

Often the best way to protect an item in storage is to place it in a container. This will help keep it clean, will keep fragments or other detached parts with the item, and depending on the type of container, will protect the item from being broken as well as assist in moving it from one place to another. Containers range greatly in variety and include such enclosures as boxes, bags, and small glass bottles (for tiny loose pieces such as beads).

Boxes

Boxes are probably the most commonly used containers. They should be strong enough to support the weight of the item(s) they contain without buckling, and yet be as light as possible so they do not add unnecessary weight and bulk. All materials used in the construction of boxes should meet preservation standards as much as possible. Boxes can be made in-house or purchased from a commercial supplier. It is easier and probably more cost-effective to buy them. Commercially available boxes range from expensive cloth-covered and lined varieties to less costly self-assembly types made of uncovered acid-free cardboard. They are available in custom or standard sizes and vary from ones large enough to hold a dress to those small enough to accommodate a single piece of ball ammunition. Commercially available two-piece boxes of simple construction in standard sizes are probably the least expensive and most practical choice for the majority of situations.

Many museum professionals find small standard-sized boxes to be invaluable in drawer storage. These relatively low-cost boxes can be used to contain round objects that roll, heavy objects that slide, or detached pieces of items that shift and become misplaced when the drawer is opened and closed. They also can be used to hold natural materials, such as fiber cord or strips for weaving, so they will not spill or become entangled in a drawer. The use of boxes makes items easily portable, protects them from physical damage, and prevents them from becoming lost. Finally, boxes can be used to subdivide a drawer to house many small items.

Why Are Supports and Mounts Important?

Supports and mounts vary widely and include such devices as pads, rings, tubes, trays, and hangers. Many items, particularly weak and physically damaged ones, need the protection of a storage support or mount to enable them to be stored safely without losing their shape or suffering further physical damage. Several examples illustrate this.

- A buckskin vest needs the benefit of a padded hanger to support the rounded shape of the shoulders when it is hung, so that the skin does not crease or break at the shoulders from the weight of the vest, especially if the skin is weak.
- A dress with glass beads is too heavy to hang and needs to be stored flat. To prevent the textile from which the dress is made from creasing and eventually breaking where folded, it needs to be stuffed with crumpled acid-free tissue along its folds to avoid sharp creases.
- Woven sashes, because of their length and weight, cannot be hung without becoming distorted. They need to be stored flat, but because of their length they must be folded. To avoid creating creases that could eventually become breaks, the sashes need to be folded over acid-free tubes cushioned with acid-free tissue. If tubes are not available, acid-free tissue can be rolled or twisted into a similar shape and used by itself.
- A ceramic pot with a rounded base needs a ring support to immobilize it so it does not roll on the shelf where it will be stored. This needs to be shaped to fit the pot from a piece of rigid polyethylene or from tubular (circular rod) polyethylene foam.

Standards

What Is the Best Type of Container, Support, or Mount?

Selecting the best type of container, support, or mount involves assessing the materials from which the item is made; its construction, size, shape, condition, and use; the availability of space for storage; the need for access to the item; the need to have interns and volunteers make the container, support, or mount; and the cost.

Containers can be custom made to fit a specific item. Often, however, as mentioned earlier, commercially available standard-sized containers are adequate or can be modified to fit a particular item. Unlike containers, most supports and mounts need to be custom made. Sometimes they need to be made to the size and shape of one particular item. Other times, one support or mount can be made to hold several items. For example, a padded acid-free cardboard mount with sets of cotton ties can hold several small dolls that are stored in a drawer. The dolls are held in place on the board with the ties. The padding on the board reduces vibration to the dolls caused by the drawer's movement. The board is made to fit in the drawer in such a way that it does not shift as the drawer is opened and closed, thus protecting the dolls from sliding. This mount has the added benefit that the dolls can be moved on it, such as from the drawer to a research area, being supported while in transit without being handled. Also, custom mounts that hold several items rather than just one make more efficient use of storage space. Containers and, in particular, supports and mounts are essential to the preservation of some items and should be provided if at all possible.

From What Materials Should Containers, Supports, and Mounts Be Constructed?

Whenever possible, containers, supports, and mounts should be made from materials that meet standard museum preservation requirements. These requirements vary depending on the material. In general the materials should be chemically and physically stable, durable, and non-damaging. Materials that do not meet these requirements can cause irreparable visual, chemical, and physical damage.

What Do the Terms Archival Quality, Conservation Quality, *and* Preservation

Quality *Mean?*

These terms have been used over the years to imply that materials meet standard museum preservation requirements. The terms have been loosely used, however, and given a variety of meanings, especially by manufacturers and suppliers of storage materials. For this reason, it is best *not* to rely on these terms but to use specific characteristics. Please note, though, that to simplify discussion, the term *preservation quality* is used here to describe materials with these characteristics.

Are There Standards That List Specifications for Storage Materials?

Yes, there are national and international standards. They are produced by such organizations as the American National Standards Institute (ANSI), the National Information Standards Organization (NISO), and the International Standards Organization (ISO). These important standards specify in technical terms the characteristics that are recommended by the organization producing the standard. For example, one standard, ISO 18902.2001, formerly ANSI IT 9.2 – 1998, specifies storage materials for photographic processed films, plates, and papers and can be followed in general for the storage of most non-photographic paper-based materials as well. Although there is still not complete consensus among the organizations, they are moving toward agreement. Very few of these standards are cited in supplier catalogs at the present time. Those that tend to be listed in catalogs are mentioned at the appropriate place. For your purposes, it is probably best to rely on the characteristics discussed below when selecting storage materials.

Why Is Chemical Stability Important?

Some of the deterioration that items in storage suffer is caused by the acids and other harmful substances in the containers, supports, and mounts that are used to protect them. These harmful substances migrate from storage materials into the items, causing such problems as discoloration, corrosion, and embrittlement. For example, discoloration caused by an acidic window mat can disfigure and hasten the deterioration of a drawing on paper that has been matted and framed. Similar damage takes place when a textile item, such as a shirt, is wrapped in acidic tissue that discolors the textile and transfers acidity from the tissue to the textile,

speeding its deterioration.

To avoid these problems, it is essential for all storage materials to be chemically stable—to *not* generate any harmful substances. If this is not possible, a chemically stable barrier can be used between the storage material and the item. For example, an acidic cardboard tube can be covered with a stable material such as polyester film, which acts as a protective barrier between the acids in the tube and the item rolled on it.

Fabrication Materials --- Paper

Paper-Based Storage Materials Should Be Acid-Free

Paper-based materials are used widely, being readily available commercially and relatively affordable. Paper materials are made from cotton, linen, or wood fibers, with wood being used most often. Wood, however, contains highly damaging impurities that lead to the formation of harmful acids. For this reason, only paper materials made from wood pulp that has been chemically purified to remove lignin and other damaging impurities are safe to use. Paper materials made of 100 percent cotton or linen are also safe to use. Folders, envelopes, tissue, and papers for interleaving sheets should be lignin-free and made of chemically stable fibers. The board for boxes should also be lignin-free and chemically purified. The board used for matting drawings and other sorts of items should be a 100 percent cotton or linen rag board or an otherwise lignin-free, chemically purified conservation mounting board. Tapes for making mats, folders, and boxes should be chemically stable, non-staining, and free of damaging components if possible. Such materials commonly are described as *acid-free*. It is important to be aware that *not* all paper-based materials are acid-free. Standard museum preservation practice maintains, however, that only acid-free materials should be used.

Why Is pH Important?

Knowing the pH of paper-based storage materials will tell you whether they are acid-free. The acidity and alkalinity of paper and paper-based materials are expressed by pH, a measurement on a scale of zero through fourteen. Seven is the neutral point, with measurements under seven indicating increasingly acidic, and

over seven indicating increasingly alkaline conditions. Although the recommendation varies for what an ideal pH for storage enclosures should be, depending on the item to be stored, a pH of 7.0 through 8.5 is a good general range.

It is advisable to measure the pH of purchased storage materials to insure that they are acid-free (pH over 7), because sometimes materials do not meet their advertised levels. There are several methods for measuring pH. The simplest is the use of a pH detector pencil or pen, which indicates the surface pH of the material being tested (never to be used on a cultural object). This method is suitable for most situations. These pencils and pens are relatively inexpensive and readily available from conservation suppliers. A more specific pH reading can be obtained by using pH indicator strips. The most accurate readings are those provided by pH meters. These latter two methods are used primarily by museums.

What Is an Alkaline Reserve?

Some paper-based storage materials contain a buffering agent, such as calcium carbonate, added during manufacture. This buffering agent is referred to as an alkaline reserve. The alkaline buffer neutralizes acids as they form in the storage materials and helps keep the materials acid-free long-term. Over time, however, the buffering agent may eventually be depleted.

Should Buffered or Unbuffered Materials Be Used?

Buffered materials are appropriate for storing some items but not others, and you must know which to use. Museums keep supplies of both buffered and unbuffered materials and use whichever is appropriate for the item being stored. It is, however, expensive to keep both types of supplies on hand. Also, it is impossible to distinguish between them visually, so they must be clearly marked. The easier and safer approach for most people is to use acid-free *unbuffered* materials for everything.

What Are Molecular Traps?

One relatively new type of storage material incorporates molecular traps to provide

added protection from gaseous pollutants. Molecular traps, such as activated carbon or natural or synthetic zeolites, capture and retain pollutants. These are most suitable for storage materials that will be used in highly polluted areas or for items that are particularly sensitive to pollutants. Storage materials that contain molecular traps are available as paper or board and are sold under the trade name of MicroChamber.

Durability

Items should be stored only in containers that are sufficiently durable to protect them. If containers are not sturdy, the items they contain may become distorted or broken, or the container itself may become damaged or even fall apart. Needlessly strong storage containers may also present problems, adding unnecessary weight and bulk that can lead to handling and spatial difficulties.

Fabrication Materials --- Plastic

Are Plastics Safe to Use?

Plastics lend themselves well to constructing containers, supports, and mounts, but they vary greatly in chemical stability and should be used knowledgeably. Some plastics are unstable chemically and produce by-products as they deteriorate that accelerate the breakdown of many materials used in cultural items. These should always be avoided, even though using them is tempting because they are easily obtained and inexpensive. Three types of plastic meet preservation standards. These are polypropylene, polyethylene, and polyester. These plastics come in many forms with different characteristics—planks or foam, rolls or sheets, hard or soft, thick or thin, opaque or transparent—and are sold under different trade names.

Polyvinyl chloride (PVC) should *not* be used in any form—not as sheeting, a photograph sleeve, or a tube—because of the damaging by-products it emits. The same is true of bubble-pack; do *not* use it, because of possible coatings, physical damage, or harmful by-products. *Avoid* polyurethane, like that commonly found in seat cushions; it turns to powder as it ages and gives off damaging by-products. Finally, do *not* use polystyrene, as this has a tendency to become brittle and yellow as compared to other acceptable plastics. Generally it is important to determine that

the plastic materials you use for long-term storage are one of the three safe types.

Fabrication Materials --- Fabric

Fabrics

Several factors determine a fabric's safety for use. One is the fiber from which it is made. Certain fibers, such as silk, are by nature acidic and should not come in contact with items that are vulnerable to acid. Other fibers emit harmful volatiles, such as sulfur compounds. Fabrics and felts containing wool are an example. Wool is also a food source for insects. These fibers should be avoided.

In most instances the safest fiber choice is cotton or linen because these are by nature chemically stable. If these are not readily available, polyester is an acceptable alternative. An unsized fabric is best. Sizings and surface applications are used to stiffen fabrics or make them fire-, water-, or stain-resistant. All fabrics, regardless of fiber content, should be washed prior to use to remove any of these potentially harmful sizing or finishing compounds. The use of dyed fabrics is problematic because permanent damage can occur if the dye transfers or bleeds onto an item due to contact with high relative humidity or water. Preferably only undyed fabrics should be used.