

STORAGE AND HANDLING

4.1 Storage and Handling for Books and Artifacts on Paper

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INTRODUCTION

By itself, any single paper item or book would seem easy to store and simple to preserve. However, most collections present challenges based simply on their size and the number of items they contain. When combined with considerations about storage space, storage methods, and shelving, the challenges of storing one item among many become complex.

Storage and handling methods have a direct impact on the useful life of collections and the accessibility of information. Damage to collections can be avoided by preventing overcrowded, careless, or haphazard storage conditions. Chemically unstable and improperly fitting shelving and storage enclosures accelerate the deterioration of materials they are intended to protect. Normal use causes wear, but inexperienced and rough handling can quickly lead to extensive damage to collections requiring expensive repair or replacement. The longevity of collections can be extended significantly by putting into practice the guidelines discussed here.

BOUND VOLUMES

Hardcover books appear to be the most robust of the paper-based materials because of their hard covers and complex construction. Careful viewing of any book collection, however, will reveal that those very properties work against the items when improperly stored. To prevent damage to books while sitting on the shelf and while being used, a few relatively simple steps should be taken: adequate air circulation, proper shelving practices, housing books in custom protective enclosures where needed, and encouraging safe handling practices for staff and users.

To prevent damp or stagnant pockets of air (that can lead to mold growth) good air circulation should be maintained in storage areas. To help promote circulation:

- do not block or deflect heating or cooling vents;
- store books at least three inches away from exterior walls, especially when in below-grade storage areas; and
- periodically open closed cabinets, especially those housed against exterior walls or those that are fireproof.

Shelving Bound Volumes

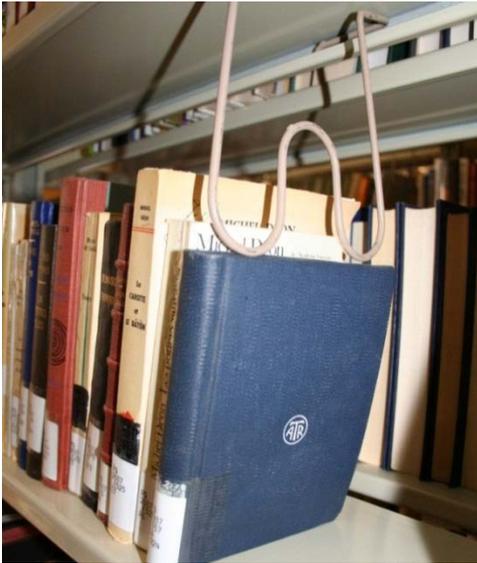
The first step in safely storing bound volumes is to ensure adequate shelving. Shelving that is too shallow allows books to extend beyond the edges of the shelf, which exposes them to book trucks, backpacks, vacuums, and feet. If the shelving is not sufficiently strong, shelves can bow and the entire unit can become unstable. Finally, some shelving units contain by-products that contribute to the deterioration of collections or have rough surfaces that can be abrasive. For information on selecting quality shelving for paper-based collections, consult NEDCC leaflet [4.2 Storage Furniture: A Brief Review of Current Options](#).

To avoid damaging bindings, books need to be shelved upright and supported. Non-damaging bookends with smooth surfaces and broad edges prevent bindings from being abraded and leaves from being torn or creased. Wire bookends that are built into shelving are less desirable as they are frequently an incorrect size and often damage short and tall books.

In a relatively static collection, it may be possible to arrange volumes so that shelves are full, preventing books from leaning. In actively growing and changing collections—in addition to providing support—it is also important to provide adequate space for expansion of the collection. Books should not be shelved so tightly that they are damaged when they are removed from the shelf.

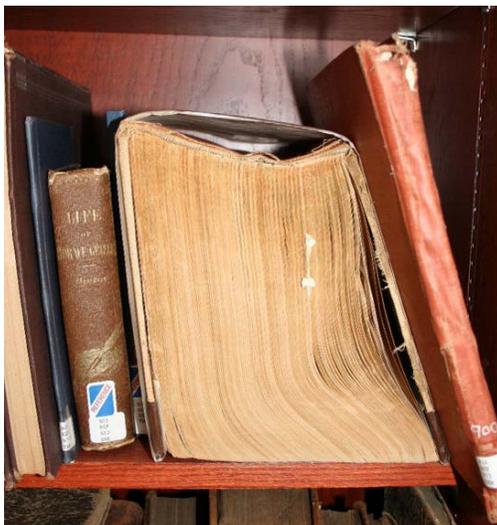


Right – safest bookend
Left – adequate bookend



Inadequate bookend

If books are too tall to fit appropriately on the shelf, they may be moved or shelves rearranged so that the books fit on the shelves standing upright. If moving or rearranging is not possible, store volumes with the spine down (storing a book with the spine up may cause the text to pull out of the binding due to its weight). Call numbers can be moved from the spine to the upper right corner of the cover for oversize volumes (height is determined by an individual institution's shelf height) to allow for identification when shelved in this way. As much as can be managed, shelve books by size since small volumes cannot adequately support larger ones.



Damage to book from being stored spine up

House very large or heavy volumes lying flat, because upright storage can result in heavy books pulling away from their bindings. When books are stored horizontally, stacks should only be 2-3 volumes high to make retrieval less intrusive. As for upright books, shelves should be wide enough to support oversize books completely so that they do not protrude into the aisles. Bindings with special value should be boxed to prevent abrasion to the bindings when stored flat. Take care to ensure

that call number flags or titles are visible so that the books can be identified on the shelf.

Custom Protective Enclosures

Custom protective enclosures provide books with structural support and protection from dust, light, and mechanical damage. Detailed information on boxes can be found in NEDCC's forthcoming leaflet 4.5 *Custom Protective Enclosures*. For the best level of protection, enclosures should be constructed of permanent, durable materials and custom made to fit the book's dimensions exactly. Enclosures come in many varieties and each has its strengths: drop-spine boxes, phased boxes, wrappers, slipcases, book shoes, dust jackets, and pamphlet binders. Candidates for protective enclosures include:

- volumes with fragile bindings of special value that should be retained in their present condition;
- damaged books that have low value or are rarely used and do not warrant treatment or repair of the binding;
- thin, small, fragile, limp, or oddly-shaped volumes; and
- parchment bindings.

Drop-spine boxes provide rigid support and restraint, especially for parchment bindings, which can easily warp in fluctuating environments. Phase boxes can provide support and protection to larger books. Both drop-spine boxes and phase boxes are available from a wide variety of vendors and library binders. Wrappers provide support and protection for small books and can easily be constructed in-house with minimal equipment. Slipcases are not recommended because they abrade the surfaces of bindings when the book is removed or replaced (note: many volumes were issued with slipcases and these should be kept together). A book shoe may be appropriate for volumes that require structural support but cannot be placed in a box (for example, books on display in an historic house that are part of a permanent exhibit). For books that have red rot or otherwise could affect other books stored around them, polyester dust jackets provide simple and inexpensive protection. Envelopes are sometimes used for the storage of books but do not provide the support required by damaged volumes and should ideally be replaced with one of the previously mentioned enclosures. Envelopes can also damage materials when physically removing or replacing items through abrasion or tearing. Rubber bands and string are damaging and are not appropriate means of holding books together. Instead, volumes can be boxed, wrapped in paper, or tied with a flat and undyed cotton, linen, or polyester tape. Tape should be tied at the top or fore-edge of the textblock to prevent bows and ties from damaging adjacent volumes.

Handling Bound Volumes

Poor handling procedures can cause significant damage to books, resulting in restricted, delayed, or discontinued use, or requiring expensive treatments before the volume can be used again. Pulling a volume off the shelf by the headcap can damage the spine and joints of the book.



Incorrect method of removing a book from the shelf

Do not pull on the headcap of a book when removing it from the shelf. Instead, there are two alternatives. The first is to put a finger on top of the pages (rather than the headcap) and gently tilt the book out. The other is to push in the books on either side of the desired book. Then pull out the desired book by gently grasping it on both sides with the thumb and fingers (or pull the book out by using the textblock as leverage, not the headcap). Once removed, the remaining books on the shelf and the bookends can be shifted so all books are supported. When the book is replaced, the bookend should be loosened, the books moved on the shelf to make a space, and the book reinserted in the space. The bookend should then be repositioned.

For special collection materials, placeholder blocks can be used to reduce shifting that can lead to damage. Placeholder blocks can be made from Ethafoam, cloth covered wood, or foam core and should be labeled and stored throughout the storage area for easy access.

When oversize books that are stored flat are removed, transfer the upper volumes to a permanently dedicated and labeled empty shelf or book truck. Lift oversize volumes with both hands, and once the desired volume is reached, return removed volumes to the shelf. Putting the book back on the shelf should be done in the same way. For very large or heavy volumes, two people may be necessary to reduce the risk of injury.

Using book trucks to move volumes is strongly recommended. When using book trucks, use bookends as if the books were on the shelf, or stack volumes according to size so they do not extend beyond the edges of the truck. Keep the center of gravity of the loaded truck low to help stabilize it and use extra caution when wheeling trucks into and out of elevators or over thresholds to prevent items falling off the cart.

When special collections volumes are used in a reading room, cradles, snakes, and page-turners should be made available to researchers to support stiff and fragile bindings. A helpful video produced by University of Glasgow Archive Services and Special

Collections department entitled “Handling Bound Volumes” <http://www.youtube.com/watch?v=UHcx6pZ57Pc> and for general handling of special collections materials at “Handling Harvard’s Special Collections” <http://www.youtube.com/watch?v=UOv0SOQ8B68>.

NOTE: Page-turners can be anything thin to slip in between pages, including microspatulas, thin Teflon folders, or simple items made out of stiff paper.

Staff training for safe handling practices is important to ensure that materials will be preserved during processing and also when being used by the public. Users should be instructed in the careful handling of bound volumes and in the use of the cradles and snakes in an initial orientation, as well as when formats change and require different handling practices.

Photocopying or Scanning Bound Volumes

Books are often unnecessarily damaged during copying. Photocopy machines and flatbed scanners encourage pressing the binding flat in order to get a good image. Overhead scanners are better for public use because they allow a book page to be copied with the book open less than 180 degrees.

Copying or scanning of books from special collections should be done by staff members (if the materials are particularly fragile). If materials are stable and an overhead scanner is available, researchers can be trained to make their own copies. Digital cameras can also be used with the proper policies in place. For guidance in using digital cameras in special collections and archives, see “*Capture and Release*”: *Digital Cameras in the Reading Room* at <http://www.oclc.org/research/publications/library/2010/2010-05.pdf>.

Marking Special Collections Materials

When marking special collections materials, the best practice is to use non-damaging methods. Interior markings should only be made in pencil. Painting call numbers on spines or attaching labels with pressure-sensitive tape can be permanently disfiguring or damaging, and may discolor the binding. Call numbers can either be typed onto text-weight, alkaline paper flags placed inside the volume, or placed on a box containing the volume. Flags should be about two inches wide and two to three inches longer than the book is high. Avoid the flags with cut out tabs that fit over the page as they can be damaging. For volumes with powdery leather bindings, a dual solution can be to construct polyester film jackets and place call number labels on the jacket, thus labeling the volume and protecting adjacent volumes from the red rot.

Attaching bar code labels to special collections materials is not recommended because the books may be damaged by the adhesives or during future removal of the label. If bar codes, RFID tags, or any other adhesive label must be used, the tag can be attached to a flag, on the box, or on a polyester film jacket as mentioned above.

If bookplates are used, they should be made of acid-free, lignin-free, buffered paper and attached with a stable, reversible adhesive, such as starch paste or methyl cellulose.

When possible, remove ephemera such as bookmarks, scraps of paper, and pressed flowers. This will prevent acidity in unstable inserts from migrating into book pages and damaging them, and reduce strain on the structure. If inserts need to be kept in place, house items in small polyester or acid-free, lignin-free, buffered sleeves in the book. If there are too many items to safely store in the book, label the pieces to record the location in the book, and store boxed in folders. Paper clips and staples should also be removed. To learn about proper removal of paper clips and staples, see NEDCC leaflet [7.8 Removal of Damaging Fasteners from Historic Documents](#).

For books that do not have special value, care should be taken to ensure that the label adhesive will remain effective over time. It is especially important that the adhesive does not desiccate, which causes labels to come loose or fall off, and does not ooze, which causes stickiness on the book that will attract dirt and may damage other materials that come into contact with it.

Pamphlets

Pamphlets are small texts not bound in hard covers, yet often stored with hardbound texts. Because of this, pamphlets sustain considerable damage unless they are stored in a protective enclosure. One of the most common enclosures is a pamphlet binder. When using binders, select those that do not require gluing the pamphlet in but those that allow the pamphlet to be sewn in, or have pockets or 4-flap enclosures built in. Binders with pre-glued hinges will obscure information and damage the paper of the cover and pages of the pamphlet over time. Modern pamphlets can be stapled in to binders if stainless steel staples are used. Historic or brittle pamphlets are best housed in binders with 4-flap wrappers or in folders in boxes.

Pamphlets can also be housed in acid-free, lignin-free, buffered folders. If pamphlets are in stable condition, contain fewer than 50 pages, and are similar in size, they can be housed spine down in groups of up to five items in one folder, with optional wrappers of buffered paper to protect from abrasion. Pamphlets that are brittle, torn, otherwise fragile, or especially thick should be foldered individually. Folders can be housed either in document storage boxes or in buffered hanging files in metal file cabinets.

Groups of pamphlets that are the same size and title can be housed together in custom boxes or wrappers. This strategy is economical and practical for pamphlets that are physically and chemically stable, and for titles that are accessed infrequently. Another affordable alternative, “shelf files” (e.g., open magazine/pamphlet boxes,) unfortunately provide little support or protection from light and dirt, and may damage pamphlets as they are accessed from these open, stiff-sided enclosures. As such, they are not recommended for paper-bound materials.

Scrapbooks

Many historical collections include scrapbooks which pose challenging preservation problems because they often contain a variety of components and media. They may have raised surfaces, three-dimensional decoration, or moving parts. They are frequently unique, fragile, damaged, and of significant associational value. The scraps themselves often cause the binding to bulge and be unduly stressed. Scrapbooks should not be stored on shelves with other bound materials because damage may result from the different sizes, shapes, weights, and conditions.

Scrapbooks can be individually stored in custom-fitted boxes. This is especially true for those of special historic value in their original form. Boxes of this type can be purchased economically from a variety of vendors. When measuring for custom boxes for scrapbooks, the most important thing to remember is to measure the widest width, the tallest height, and the thickest point in the binding. For more information on measuring, see NEDCC’s forthcoming leaflet 4.5 *Custom Protective Enclosures*, LINK.

For scrapbooks that are very damaged and do not have value to the institution as an object, pages can be numbered and put into individual folders and boxed, which will protect the contents and provide easier access.

UNBOUND DOCUMENTS

Manuscripts and other unbound documents are vulnerable to damage from inappropriate storage and handling practices because of the commonly brittle or fragile nature of the paper. To protect loose sheets during storage and handling, there are some basic practices to follow, including: foldering and boxing with chemically stable materials, removing corroded fasteners, storing materials by size and type, and encouraging safe handling practices for staff and users.

Storage and Boxing

Unbound documents should be housed in acid-free, lignin-free, buffered file folders. When the paper is stable, several sheets can be stored in one folder by creasing the bottom of the folder to accommodate the thickness of the papers. Fragile paper may require fewer sheets per folder or an individual polyester sleeve.

Documents and manuscripts should be unfolded for storage if this can be done without splitting or fracturing them. If a fragile paper resists unfolding, or if unfolding may result in damage, a preservation or conservation professional should be consulted before proceeding. Letters should be stored with their corresponding envelopes.

Ideally, every fastener on historic documents would be removed during arrangement or cataloging. If the institution has chosen to follow More Product, Less Process (Mark A. Greene and Dennis Meissner, *The American Archivist* 68, no. 2 (2005): 208-63. <http://archivists.metapress.com/content/c741823776k65863/fulltext.pdf>), a discussion needs to be held with staff and

administration to stress the importance of at least removing already corroded staples, paper clips, and pins to prevent further damage. Any non-stainless steel fastener that will be stored in an uncontrolled or unstable environment should be removed as well, to prevent inevitable future corrosion. To learn about proper removal of paper clips and staples, see NEDCC [leaflet 7.8 Removal of Damaging Fasteners from Historic Documents](#). If papers need to remain clipped together, use an acid-free, lignin-free, buffered paper or polyester (Melinex) barrier between the papers and the clip or use stainless steel paper clips or staples. Never use plastic clips as they cause considerable deformation.

For paper collections, objects of the same size and category should be stored together. Differences in size and thickness within an enclosure create a potential for physical damage, so it is not advisable to store flat sheets in the same box with books or pamphlets. For the same reason, heavy objects should be stored separately from lighter ones, as should bulky objects, which cause uneven pressure inside boxes. In addition, because acid migrates from chemically unstable paper to any other paper with which it comes into direct contact, it is important to isolate chemically unstable papers such as Diazotype architectural drawings, mimeographs, and other printing processes that require chemical processing or solvents.

Folders should be kept in chemically stable document-storage boxes. All folders inside a single box should be the same size and should fit the size of the box and not the size of the sheet. There are both flat and upright boxes that are suitable for document storage.



Folders in box with spacer

Flat boxes should be stacked only two to three high to facilitate access and prevent crushing of boxes. In upright storage boxes, documents and folders should be well supported to prevent slumping, which will deform the contents. Spacers made from chemically stable materials can be used to fill in empty space to support the folders.

Care should also be taken not to overfill boxes as this can cause damage when items are removed or replaced.

Handling Unbound Documents

Careless or inattentive handling of documents and manuscripts can cause damage resulting in the loss of information or requiring expensive treatments to allow the items to be used again. When working with documents in folders, work on a flat table and keep items in the folder to maintain order. If papers are brittle or difficult to separate in order to turn, use a page-turner. As mentioned, page-turners can be microspatulas, thin Teflon folders, or simple items made out of stiff paper, basically, anything thin to slip in between pages. When using documents and manuscripts, try to handle only blank areas of the page. After use, pages should be stacked neatly in the folder and the folder returned to its proper place in the box. When handling oversize materials, be sure to have adequate room for handling, viewing, and unrolling.

Staff training for safe handling practices is important for ensuring that materials will be preserved during processing and also when being used by the public. Users should be instructed in the careful handling of unbound documents and works of art on paper in an initial orientation, as well as when formats change and require different handling practices.

Photocopying or Scanning Documents

Unbound documents and manuscripts can be damaged during copying or scanning. Care should be taken when handling any brittle materials to prevent tears or losses. Page-turners should be available to help lift fragile paper and the paper should not be allowed to slide under the frame of the platen. Multiple page documents should never be sent through the form feed on a copier or scanner.

Unbound Oversize Materials

Oversize materials—such as architectural drawings, blueprints, maps, large prints, and wallpaper samples—are best stored flat in the drawers of map cases or in large covered boxes of acceptable quality. These materials should be housed in acid-free, buffered folders inside the drawers. Because unbuffered folders are difficult to find, alkaline-sensitive materials, such as blueprints, should be stored in folders interleaved with unbuffered tissue or in polyester sleeves. All folders should be cut to fit the size of the drawer or box. Undersized folders may become lost in a stack and or even jammed at the back of a drawer. Ideally, only one item would be placed in each folder, although several may be stored together in a folder if they are similar in size and weight and they are interleaved with acid-free paper. There should be adequate space where oversize materials are stored so that they can be safely removed from drawers or shelves, and there should be a place to put them down once they are removed and prior to replacement in drawers or on shelves.

As a special note, Diazotypes should not be stored with other materials, especially VanDyke prints (for example), that are sensitive to sulfur or ammonia compounds.

If they are flexible and strong enough, oversize materials that are too large to fit in the drawers can sometimes be rolled for storage. Some items need to be rolled individually; others can be rolled in groups of four to six similar-size items, the exact number depending on the size and weight of the paper. Roll items on the exterior of a tube several inches longer than the largest item being rolled and at least four inches in diameter, larger diameters are preferable. If the tube is not made of low-lignin, pH-neutral materials, it should be wrapped in polyester film (Melinex). The rolled materials should be wrapped with neutral or buffered paper, Tyvek, or polyester film to protect them from abrasion, dust, and pollutants. The outer wrapper should be tied with flat linen, cotton, or polyester tape. This assembly may then be stored inside a larger tube for added protection, if desired.



Oversize collection rolled on a tube.

Image courtesy of the Syracuse University Photo and Imaging Center

Tubes should be stored horizontally, rather than vertically, to prevent items from getting crushed on the edges. Tubes can be stored on shelves, on racks, or using any other method that prevents them from rolling away or being bumped on the ends. For further information on this topic, refer to the NEDCC leaflet [4.9 Storage Solutions for Oversize Paper Artifacts](#).

Ephemera

Many historical collections include scrapbooks and ephemera (e.g., trade cards, valentines, patterns, paper dolls). Unbound ephemera should be grouped by size and type (photographs, printed material, manuscripts, and so on), individually enclosed to protect items from acid migration and mechanical damage, and stored in a way that will support them structurally. Some vendors of archival supplies offer standard-size storage boxes and sleeves for common ephemera such as postcards and stereo views. Others can produce custom-sized enclosures in quantity to meet special needs.

Photographs

For information on storing photographs, please consult the NEDCC leaflet [5.6 Storage Enclosures for Photographic Materials](#).

USE OF GLOVES TO PROTECT SPECIAL COLLECTIONS DURING HANDLING

In many research libraries, users are required to wear white cotton gloves when handling archival and library materials in special collections. This practice has fallen out of favor because white gloves provide limited protection for collections and reduce tactile sensitivity making it difficult to handle collections carefully and ultimately increasing the chances of physical damage. Cotton gloves have many small hairs that can easily catch on brittle edges or worsen an existing tear. Cotton is also very absorbent and thus easily soiled, picking up dirt, dust, and other materials that can then be transferred to the item being handled. Photographs, film, and metals are the exception to this rule. Users should wear gloves when handling photographic materials, since these can be damaged by fingerprints. Objects made from metals that will tarnish such as regalia, silver bindings, and any bindings with metallic boss or embroidery threads should also be handled using gloves. When gloves must be worn for the protection of the user or the collections, lint-free cotton or nitrile (in case of latex allergies) gloves should be worn. See Cathleen A. Baker and Randy Silverman's "Misperceptions about White Gloves," in Resources for more detail on the arguments against using white cotton gloves.

NOTE: Instead of wearing gloves, it is recommended that users be required to wash and dry their hands carefully before using collections, and to rewash them whenever they begin to feel dirty. Hand washing is preferable to using alcohol-based hand sanitizing gels. While these products may be effective in killing germs, they do not remove dirt and leave behind lotions and oils that can be damaging to collection materials.

As stated above, users of library and archival collections should always be instructed in proper handling procedures for the collections they are consulting.

CONCLUSION

Knowing how storage and handling methods will impact the useful life of collections and the accessibility of information will lead to improved policies and procedure. By avoiding overcrowded, careless, or haphazard storage conditions, improperly sized shelving, and chemically unstable storage enclosures, the longevity of collections can be extended significantly. While even normal use causes wear, rough handling can cause extensive damage that requires repair or replacement. Adopting improved storage methods and handling procedures will enable large collection to be preserved with systematic care particular to the many individual items.



RESOURCES

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