

BASIC GUIDELINES FOR THE PRESERVATION OF HISTORIC ARTIFACTS

INTRODUCTION

The primary mission of most history museums is to collect, preserve, exhibit and interpret objects of historical significance. Over time, all objects will begin to deteriorate for a variety of reasons, such as environmental conditions, use and natural decay. In order to maintain the objects in such condition that they will survive for the enjoyment and education of future generations, it is vital that museums practice proper preservation measures. Knowing how to handle, display and store the artifacts in your museum's collection can add a significant number of years to the life of the objects.

Most history museum collections consist of two basic categories of materials — organic and inorganic. Organic artifacts include those made from animal products such as fur, leather, wool, silk, bone, ivory, or feathers and also those made from plant products such as wood, paper, cotton and other natural fibers. Inorganic artifacts are those made from nonliving materials such as metal, stone, ceramics and glass. While in general inorganic materials are more stable and less susceptible to environmental damage than organic materials, it is best to consider all objects fragile and to treat them with great care.

The following guidelines are intended as a brief introduction to the preservation of historic artifacts. It should not be considered a comprehensive preservation manual, but rather an introductory guide to basic, general preservation principles. For more in-depth information, contact the Museum Services Program at the Texas Historical Commission (THC). The Museum Services Program exists to provide technical assistance and advice to small history museums in Texas free of charge. You may reach the staff at 512/463-5756.

A Note on Preservation vs. Conservation

Proper preservation measures can help stabilize or at least slow down an object's rate of deterioration, thus extending the life of the object. In general, museum staff and volunteers can successfully and reasonably undertake most preservation practices. However, if an artifact requires repairs, major restoration, or major cleaning, or if basic preservation measures do not slow an artifact's rate of deterioration, the museum should contact a professional conservator.

Conservators usually have extensive training in a specific type of material. For example, conservators may specialize in textiles, metals, photographs, wood, paper, glass, ceramics, or paintings. To locate a conservator, contact the Texas Historical Commission's Museum Services Program (512/463-5756), or consult the directory published by the American Institute for the Conservation of Historic and Artistic Works (AIC) (<http://aic.stanford.edu/>). The Texas

Association of Museums (TAM) also maintains a listing of Texas-area conservators on its website (www.io.com/~tam/).

HANDLING HISTORIC ARTIFACTS

In general, you should handle artifacts as little as possible. The oils, acids and salts in human skin will damage most all types of materials over time. Whenever it is necessary to touch an artifact — for example, when setting up or taking down an exhibit or when re-housing the artifact for storage — use clean, dry, lotion-free hands. Or more preferably, wear clean cotton or latex gloves. Follow common sense, though, and do not wear gloves if the object could easily slip from gloved hands. Remove watches, rings and other jewelry that might snag, scratch or chip the surface of the artifact. Also be aware of belt buckles, buttons and other accessories that may come in contact with the artifact.

All artifacts should be treated as if they are extremely fragile, even if they do not appear so. It is also important to know the history of the artifact so that you're aware of any previous damage, repairs, loose parts or weak spots. Avoid picking up objects by handles, straps or other protruding components. If an item breaks, make every effort to collect all detached or broken pieces. A well-trained conservator may be able to repair it.

Ideally, artifacts should be handled and/or moved one at a time. Do not stack items in order to move them. In the case of very small, light artifacts, you may place them in a well-padded basket or tray, but do not allow the artifacts to touch. Do not try to carry large, bulky or heavy objects alone. Always pick up an artifact — never push, pull or slide it. Use both hands and provide full support to the entire object, especially the base.

Move furniture by gripping structurally sound components such as the seat frame or base. To avoid sagging in the middle, paper items and most textiles should be placed on a large, stiff piece of acid-free mat board. Very large textiles such as rugs should be rolled on an acid-free tube and carried by at least two people. Move framed works of art or mirrors vertically rather than horizontally by gripping sturdy areas of the frame and carefully supporting the bottom and side. Use padded carts or trolleys when necessary.

Before moving any artifact, make sure you have a clear place to set it. The work space should be clean and free of food, beverages and sharp instruments such as pens, tools, paper clips and keys. If possible, lightly pad the work surface (with archival quality materials) to reduce the risk of objects sliding or rolling off.

If you have questions about how to handle a particular artifact in your collection, contact a professional conservator or call the THC's Museum Services Program at 512/463-5756.

CREATING A PROPER ENVIRONMENT

The major environmental factors that affect the long-term preservation of artifacts are light, temperature, relative humidity, air pollution and pests. Museums must take proper action to mitigate the possible damage of these factors.

LIGHT

There are three types of light: ultraviolet (UV) light, infrared radiation and visible light. All three types are harmful to artifacts and the damage caused by all light is cumulative and irreversible. In fact, displaying an object under ideal museum lighting conditions for just a few weeks could have the same effects as exposing it to bright sunlight for a day or two.

Exposure to light in all forms causes a chemical reaction to happen within the molecular level of an artifact. Light exposure can cause textiles to weaken and fade, dyes and paints to darken or change color, and paper to become weak, bleached, yellowed or darkened. The best preservation practice would be to house all artifacts in complete darkness. Although the exhibition needs of museums will not allow for that, you can take several steps to reduce the harmful effects of light.

Because UV light is the most harmful type of light, make every effort to exclude or filter UV sources. The most common sources of UV are natural daylight and fluorescent lamps, but tungsten-halogen lamps and high density discharge (HID) lamps also give off significant levels of UV radiation. Sources of natural light should be eliminated from all museum exhibit and storage areas when possible, or filtered when elimination is not possible. Cover windows with shades, drapes or blinds. Film products and Plexiglas-type sheeting are other UV filtering options.

Many small museums are lit by fluorescent lights. Museums can reduce the amount of UV exposure from these lights by installing UV filters on the bulbs. Filters come in the form of hard plastic tubes or soft plastic sleeves, either of which can be wrapped around the light bulb. Prices of the UV filters start at around \$50 per dozen and can be purchased from a specialty lighting store or from an archival supply catalog. Filters generally block up to 98 percent of all UV light, but they lose their efficiency over time and should be replaced approximately every 8–10 years.

While incandescent lights do not give off UV, they can emit a significant amount of heat. Therefore, incandescent lights should not be placed inside or near exhibit cases. Use the lowest wattage possible and make sure areas surrounding the incandescent bulbs are well ventilated.

Even visible light can damage the museum's collections. The museum can reduce the harmful effects of visible light by simply turning off the lights as much as possible. Lights in the exhibit area should be turned on only when visitors are on tour or when staff is working on the exhibits. Keep the storage area completely dark except for when staff is retrieving or working with an artifact. Ideally, each exhibit area and the storage area should have its own light switch so that light can be turned on only in the area where needed.

The following chart provides the recommended light levels for artifacts on exhibit. When exhibiting mixed collections, choose the recommended light level for the most sensitive artifacts on display. Light levels can be measured with light meters (lux and UV), which can be purchased from archival supply catalogs.

	Visible light	Ultraviolet (UV) light
Sensitive collections Including textiles, watercolors, photographs and other papers	Maximum: 50 lux (5 footcandles)	Ideal: 0 - 10 microwatts per lumen Maximum: 75 microwatts per lumen
Less sensitive collections Including oil paintings, wood and leather	Maximum: 150 lux (15 footcandles)	Ideal: 0 - 10 microwatts per lumen Maximum: 75 microwatts per lumen
Least sensitive collections Including most metal, ceramics, stones and glass	Maximum: 300 lux (30 footcandles)	Ideal: 0 - 10 microwatts per lumen Maximum: 75 microwatts per lumen

Another way to reduce the harmful effects of light on museum objects is to rotate the artifacts on display. Return sensitive objects to storage after three months; less sensitive artifacts can be displayed longer, but periodically return them to storage for “rest.”

TEMPERATURE AND RELATIVE HUMIDITY

Providing a properly controlled and stable environment is critical to the long-term preservation of the museum’s artifacts. The ideal levels vary, however, depending on the type of artifact in question. For instance, metal objects can withstand a wider range of temperatures than can paper or textile objects. Because most museums have mixed collections, with artifacts of all types, compromises must be made. A happy medium is a constant temperature somewhere around 68 to 72 degrees and humidity levels of approximately 45–55 percent.

More important than achieving those particular numbers, however, is maintaining a steady environment. Fluctuation is what causes the most damage. The temperature and relative humidity levels inside a building with no heating, ventilating and air condition system (HVAC), or with an inadequate HVAC system, fluctuate widely with the heating of the day and then cooling of night. Objects made of organic materials such as paper, wood, leather, textiles, etc. swell and contract according to the temperature and humidity levels, and can suffer irreversible damage when subjected to such fluctuation. They may warp, become brittle, tear, break, split, grow mold — any number of things.

Daily fluctuations are more dangerous than seasonal ones. Turning the system off at night or on weekends will have the same negative impact on the museum’s collections as if there were no climate-control at all. Therefore, the museum must choose a temperature and relative humidity level that it can maintain 24 hours a day, 365 days a year. Seasonal variations can be acceptable if they are introduced gradually.

Besides providing appropriate temperature and relative humidity control, a quality HVAC system will also help reduce pest activity and air pollutants. Higher temperatures and humidity levels invite and encourage pest activity and mold growth. Additionally, an HVAC will filter out dust, pollen and other damaging air pollutants.

AIR POLLUTANTS

There are two types of air pollutants — particulate and gaseous. Both can damage historical collections. Particulate contaminants such as dust, soot and pollen can soil, chafe or otherwise blemish artifacts. Gaseous pollutants such as ozone, peroxides, nitrogen oxide and sulfur dioxides can react chemically with other materials to form acid which can harm artifacts. The acid can form within the artifact itself or it can migrate from one material to another.

Pollutants can be controlled with a quality HVAC system and good quality filters for all vents, furnaces, and air conditioners. The systems should be routinely cleaned and regularly maintained. It is also helpful if the intake vents are not located in heavily trafficked areas or other poor air quality areas. Avoid storing or exhibiting artifacts near fireplaces, cooking places or smoking areas. Keeping all windows and doors closed tightly will also ensure a reduction in pollutants.

General museum housekeeping, such as cleaning the floors, walls, windows, storage shelves, light fixtures and office equipment is essential to reducing the air pollutants in the museum. Use only mild cleansers and avoid harsh commercial cleaners that contain ingredients such as bleach or ammonia. Chemicals and gasses given off by harsh cleansers can transfer to artifacts. If it is absolutely necessary to use such products, use the smallest amount possible and make sure the area is well ventilated. Vacuum floors with a quality vacuum cleaner with HEPA filtration or damp mop them with plain water. Be careful about using harsh construction materials such as adhesives, paints and sealants near artifact collections.

PESTS

Pests can mean big trouble for museum collections. The three categories of pests are: microorganisms, such as mold and mildew; insects, such as moths, beetles and silverfish; and vertebrates, such as birds and mammals. The best defense is a combination of prevention and constant vigilance.

Prevent pest infestation by maintaining proper temperature and relative humidity levels. Higher temperatures and humidity levels invite and encourage pest activity and mold growth. Make sure the museum building is well sealed, so it is impossible for pests to enter the building. Also, discourage pest activity by eliminating food, beverages, potted plants, dried and fresh flowers from collections storage and work areas and from exhibit areas. Outside the building, avoid plants and flowers that attract insects. A dust-free museum environment will also reduce insect activity, so good housekeeping is a must.

Regular monitoring for pests can help detect their presence before a major infestation occurs. Place sticky traps strategically throughout the museum to monitor what kinds of pests are getting

in and in what numbers. Periodically inspect artifacts on display and in storage for evidence of insect activity — eggs, larvae, powdery deposits or small holes. During inspections, look for signs of mold or mildew. Any contaminated artifact should be placed in isolation immediately.

If an infestation is spotted, contact a professional exterminator. Choose an exterminator who is willing to work with the museum and its unique needs. Harsh chemical sprays and treatments should be avoided when possible. While an exterminator can treat the general museum environment, a professional conservator should be consulted to treat the artifacts themselves.

A properly regulated museum environment will include controls for light, temperature, relative humidity, air pollutants and pests. If you have any questions about how to implement the proper environmental regulations in your museum, contact a professional conservator or call the THC's Museum Services Program at 512/463-5756.

STORAGE OF COLLECTIONS

Any artifact accepted into a museum's collection will likely reside in storage for a significant amount of time. Preservation measures include providing a suitable storage environment and preparing the artifact appropriately for long-term storage.

Every museum should have a collections storage area that is separate from the exhibit and office areas. The space should be used to house artifact collections only. Cleaning products, mops and brooms, surplus office supplies, extra furniture, etc. should be stored elsewhere.

For the protection of the artifact collections, the storage area should have a regulated environment as described in the section above. Temperature and relative humidity levels must be kept at constant recommended levels. Light should be kept at a minimum (complete darkness when possible), and should therefore be on a separate switch from other areas.

In addition to a proper environment, storage units — cabinets or shelves — are also important to the storage area. Museum specific storage units are the preferred option, but can be costly. The next best option is sturdy steel shelving or cabinets. Look for ones that have a synthetic polymer powder coating. Anodized aluminum is another good option.

Wood shelving can be problematic because wood emits harmful acids and other substances. Oak is the most volatile. If wood is the only option available, make sure it is properly sealed with a quality water-based polyurethane or paint. It must still be lined with some sort of barrier, such as acid-free paper or barrier board. Note: Properly prepared wood storage units are best for audio and audio-visual collections.

Artifact collections also need to be stored in suitable containers. Choose archival-safe, chemically stable materials such as acid-free boxes, tissue, foam, folders and hangers that are the appropriate size and type for each artifact. Ideally, only one artifact should be stored in each container. These containers will protect the artifacts from light, dust, harmful pollutants and pests. These items are available for purchase from a variety of companies that specialize in museum, archive and library supplies.

If the museum is unable to provide storage containers for each individual object, or if the object is too large for a container, another option is to drape the artifact in a cover made from undyed, unbleached, cotton muslin. This material, which helps protect against light and dust, can also be used to make curtain-like dust covers for open shelving units. Keep in mind that these covers need to be washed periodically.

Storage location is also an important factor in preservation. Avoid storing artifacts along exterior walls since temperature and relative humidity levels fluctuate more readily there. Also avoid storing an artifact on the ground. All artifacts should be placed at least 12 inches from the floor to protect against flooding. Similarly, never store artifacts near or below windows, water pipes, water heaters, or HVAC units and vents.

Limit access to the storage area to key staff and volunteers only. Visitors and other individuals should not be allowed access to the storage area for any reason. A lockable door is also a reasonable security measure. Distribute keys and/or lock combinations only to select museum personnel.

Artifacts in storage should be inspected periodically to assess their condition. Check for any signs of deterioration and for evidence of pest activity. These inspections should be documented and saved as part of the museum's records.

If you have questions about how to store a particular artifact in your collection, contact a professional conservator or call the THC's Museum Services Program at 512/463-5756.

DISPLAY OF COLLECTIONS

While an artifact may spend much of its life in museum storage, it will likely spend some time on display as well. To ensure the long-term preservation of the object, certain measures need to be taken while it is on exhibit.

Again, maintain the proper environment as described in the above sections. Controls for light, temperature, relative humidity, air pollutants and pests should be in place throughout the exhibit area. If artifacts are displayed inside cases, make sure that the environment inside the case is as ideal as possible. Heat and moisture can easily get trapped inside the cases, so diligent observation of conditions is required.

Exhibit cases and mounting materials should be made of inert materials, especially those in direct contact with an artifact. Many small museums have exhibit cases that are constructed of wood. As previously explained, wood can emit harmful acids and other substances in a process called off-gassing. Therefore, museums should take precautions to reduce the potential harmful effects of off-gassing.

Wood cases can be altered to make them acceptable for displaying historic artifacts by sealing the surfaces with a quality, water-based polyurethane. Then the cases must be allowed to air out for at least three to four weeks. When returning the artifacts to the case, place a barrier between the artifact and the wood surface. Appropriate barrier materials include Mylar, Melinex, or acid-free buffered paper, tissue or barrier board. If surfaces require padding, consider polyester batting, polyethylene foam, or unbleached, undyed cotton muslin.

As a general rule, do not use adhesives or sticky substances of any kind to mount or aid in the display of any artifact (including photographs). Original clamps, hooks, strings, straps, or handles already attached to an artifact should not be used for support or to take the weight of that artifact. The display technique should place the least amount of stress on an artifact as possible.

Be mindful of the location of artifacts on display. Avoid displays near windows and doors where temperature and light levels can be problematic. Placing artifacts near air conditioning or heating vents should also be avoided. Be careful to not place artifacts or cases in such locations that they will be easily bumped or knocked over.

Security of the artifacts on display should also be a top concern. Whenever possible, artifacts should be placed in locked cases. If this is not possible, museum staff should monitor the exhibit area when there are visitors present.

If you have questions about how to display a particular artifact in your collection, contact a professional conservator or call the THC's Museum Services Program at 512/463-5756.

CLEANING AND REPAIRING ARTIFACTS

First of all, any stain removal or major cleaning of any artifact should be handled by a professional conservator, or at least with the advice of a professional conservator. Otherwise, cleaning may do more harm than good and could irreversibly damage the artifact. All repairs should be left to a professional conservator.

However, museum staff can carry out some routine cleaning tasks, such as dusting. Before dusting, examine the object carefully to determine how sturdy it is. Proceed only if the object is in sound structural condition. Dust can be removed with a soft, clean, white cotton cloth or a soft natural bristle brush (available from archival suppliers). Dust slowly, gently and in one direction. Do not use feather dusters because they can snag or catch on the surface of an object.

Avoid using dusting sprays or polishes on artifacts. The chemicals released by these products can be harmful, as is the build-up of the products over time. A small amount distilled water and a clean white cotton cloth can be used to remove any stubborn dirt.

Another way that museum staff can remove dust from structurally sound artifacts is with a special museum vacuum. Note that it is not acceptable to use a regular vacuum for this task; it must be done with a vacuum specially designed for use with museum collections. These vacuums allow the user to adjust the amount of suction depending on the type and condition of the artifact. Take care to use the appropriate attachment or nozzle for each type of artifact.

Vacuuming can be a particularly effective cleaning method for textiles in good condition. To insure that damage does not occur, the following procedure is recommended: begin by gently brushing dirt from the surface of the textile with a soft brush. Then vacuum the surface using a low-suction museum vacuum with a clean brush nozzle attachment. A nylon screen should be placed between the textile and vacuum during cleaning to catch any loose fragments that could be detached during the process. Cover the edges of the screen with cotton bias tape (or something similar) to keep it from snagging the textile. Vacuum both sides of the textile.

As for general museum housekeeping, such as cleaning the floors, walls, windows, storage shelves, light fixtures and office equipment, use only mild cleansers. Avoid harsh commercial cleaners that contain bleach or ammonia. Chemicals and gasses given off by harsh cleansers can transfer to your artifacts. If it is absolutely necessary to use such products, use the smallest amount possible and make sure the area is well ventilated.

If you have questions about how to clean a particular artifact in your collection, contact a professional conservator or call the THC's Museum Services Program at 512/463-5756.

ACCESS AND SECURITY

As the above sections have demonstrated, the long-term preservation of artifacts can be affected by a variety of environmental conditions, as well as by careless handling or improper exhibit and storage techniques. However, the threat to artifact condition does not stop there. Artifacts are also susceptible to loss through theft, vandalism or disaster. Museums must take measures to address these threats.

First of all, to reduce the risk of theft or vandalism, access to collections must be restricted and limited. Keep storage areas locked at all times. Only key staff should have access to collections in storage, and visitors should not be allowed to enter at all. Ideally, storage rooms should have no windows.

During hours of operation, monitored visitors while in exhibit areas. Allow visitors to enter and exit the museum through one door only. That door should be monitored as well. All exhibit cases need to be lockable and only select staff should have keys. Do not allow visitors to handle artifacts. Objects displayed openly (not in a case) should be kept out of reach by using appropriate barriers. Anytime that a particularly high-value or rare artifact is on exhibit, the museum should notify the local law enforcement agency.

The museum building in general should be kept secure. High-quality, heavy-duty locks on all doors and windows are a must. Again, distribute keys and combinations only to select staff. Keys must be collected from any staff member who leaves the museum's employ, and locks should even be changed periodically.

Other measures to reduce the risk of theft or vandalism include after-hours security lighting, security guards or patrols and automated alarm systems linked either to a security monitoring firm or local law enforcement office. Sadly, many thefts are committed by insiders, so background checks on new employees and volunteers are a wise precaution.

Disasters such as fire, flooding or violent storms can also put artifact collections in danger, as can smaller emergencies like leaking pipes or roofs. Early detection of such threats is important. Systems to detect heat, smoke and water should be in place in all museums. Fire alarms should be wired directly to the local fire department, while water detection systems can alert an off-site staff member. Situations such as leaking pipes and roofs can be detected by routine, diligent and careful observation.

The museum should also have some sort of fire suppression system. Hand-held fire extinguishers are acceptable for small fires which are detected immediately. But for fires that break out after hours, a more substantial suppression system is required. Water sprinklers are still the most common type of system because they are most economical. Museums should opt for newer systems in which each sprinkler head is activated individually, therefore releasing water only in areas in which smoke or heat is detected. A more artifact-friendly fire suppression system uses carbon dioxide (CO₂) rather than water, but it can be costly.

Every museum, no matter how small, should have a written security or risk management policy so that every staff member can systematically help reduce all threats to the museum's collections. The museum should have a written disaster plan so that all staff knows what needs to be done when disaster strikes and who is responsible for doing it. While this publication deals only with collection security, the policies should also include provisions for the safety of people. Waiting until a disaster strikes to begin planning is unacceptable. It is the museum's responsibility to act immediately to protect its people, facility and collections.

If you have questions about access or security and disaster planning, contact a professional security contractor or call the THC's Museum Services Program at 512/463-5756.

RECORD KEEPING AND DOCUMENTATION

Providing adequate care for the long-term preservation of artifact collections also requires the museum keep accurate and thorough records on every artifact in its possession. Records should be considered an important part of the object itself. A written collections policy should outline procedures for how artifacts are accessioned, deaccessioned, catalogued, loaned and cared for in general.

Proper museum records will document the following information:

- When, how, and from whom the object was acquired (establishing legal ownership)
- When the object was accessioned, to what collection and with what accession number
- A complete catalog entry including a full description of the object as well as a photograph
- Details of any damage to the object
- Results of periodic condition reports (helps determine deterioration rates, if any)
- Details of any conservation treatments on the object
- The exact location of the artifact

Accession numbers should be well-secured (though not in a permanent manner) to each artifact to help identify it and locate it. The museum should conduct periodic inventories to ensure that all objects are still in the museum's physical custody. Notify authorities immediately if any object is missing and provide them with the object's full description and photograph.

Though many computer programs are now available to assist with keeping track of all the museum's records, keeping paper copies is still a good practice. Print the records on acid-free paper and store them in acid-free folders. At least one paper copy and digital copy should be kept locked in a fire-proof cabinet on the museum's premises, while another copy should be secured off-site.

By thoroughly documenting each artifact, the museum readily will be able to determine what they have, where it is, and in what condition — thus enabling the museum to make prudent decisions regarding the preservation of its collections.

If you have questions about how to document your museum's collections, how to apply accession numbers to your artifacts, or how to write an effective collections policy, contact the THC's Museum Services Program at 512/463-5756.

CONCLUSION

Many factors contribute to the long-term preservation of artifacts entrusted to a museum's care. A well-regulated environment plays a significant role, but so does proper handling, cleaning, and appropriate storage and exhibit techniques. Those preservation efforts would be wasted, however, without providing for adequate security for the collections. And, of course, all of the museum's activities regarding preservation and security should be thoroughly documented.

This booklet is intended as a brief introduction to the preservation of historic artifacts. It should not be considered a comprehensive preservation manual, but rather, an introductory guide to basic, general preservation principles. More detailed information can be obtained by contacting the Museum Services Program at the Texas Historical Commission. The Museum Services Program exists to provide technical assistance and advice to small history museums in Texas free of charge. You may reach the staff at 512/463-5756.