

OVERVIEW

Ensuring a safe environment for collections both in storage and on display is an essential function of preservation. Collection environments are affected by many factors including the physical building, exterior climate, mechanical systems, and institutional policies. Collection environments can be evaluated by monitoring factors like temperature, relative humidity, dewpoint, light exposure, pollutants, and more. Temperature and relative humidity are two of the most important environmental indicators. They are relatively easy to monitor and directly affect the rate of decay of most materials. Understanding the effects of temperature and relative humidity, as well as how to collect and interpret that data is key to managing safe collection environments.

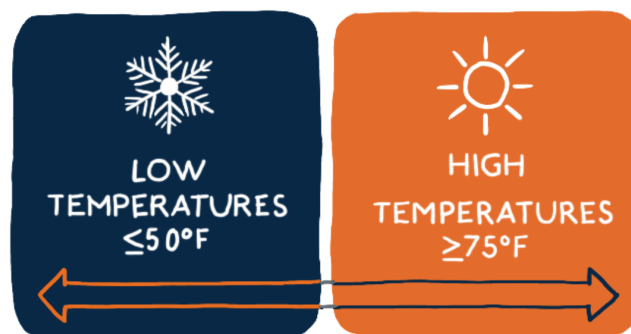
TEMPERATURE

Incorrect temperatures can cause damage to collection objects both chemically and mechanically. When temperature is incorrect, it means that temperature is either too high or too low.

Temperatures that are too high increase the rate of chemical decay for most materials. Organic materials are generally most at risk to damage caused by elevated temperatures. These materials include paper, textiles, leather, and some plastics. The Image Permanence Institute defines generally high temperatures as those above 75°F¹.

Low temperatures are beneficial for many materials because they slow rates of chemical decay. 20th century plastics and rubbers

especially benefit from cool (50°F) or cold ($\leq 4^\circ$ F) storage. However, some materials are mechanically affected by low temperatures. Plastic containing materials like modern paints and coatings can become stiff and brittle at low temperatures, which increases the risk of breaking and cracking when these objects are handled or moved. The Image Permanence Institute defines generally low temperatures as those below 50°F².



RELATIVE HUMIDITY

Relative humidity (RH) is a measure of the saturation of air with water vapor. RH is dependent on the temperature. Hotter air has the capacity to hold more water vapor than colder air, so if the amount of water vapor is constant, the RH at 75°F will be lower than the RH at 60°F³.

Materials that have the capacity to absorb and release water (hygroscopic) are affected by RH because water moves into and out of those materials until an equilibrium is achieved with the surrounding air. Low RH can result in physical damage like shrinking, cracking, and warping. High RH can cause similar mechanical stress as well as chemical decay like mold and

metal corrosion.

Large fluctuations in RH can also cause mechanical stress to hygroscopic materials and is particularly damaging to composite structures like photographs, wooden artifacts, furniture, and paintings⁴. The International Council for Museums Committee for Conservation (ICOM-CC) recommends that RH not fluctuate more than 10% within a 24 hour period⁵.

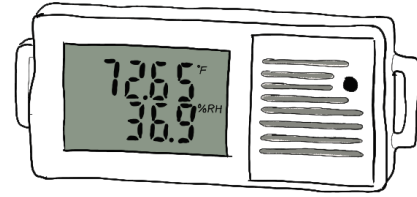


MOLD GROWTH CAN OCCUR AT 65% RH AND ABOVE

MANAGING THE COLLECTION ENVIRONMENT

While having efficient and effective HVAC systems is often the best way to maintain safe collections environments, there are also low tech strategies that can aid in providing the best environment possible:

- USE DATALOGGERS TO COLLECT INFORMATION ABOUT THE COLLECTION ENVIRONMENT AND USE THAT DATA TO MAKE INFORMED DECISIONS ABOUT POLICY
- STORE COLLECTIONS IN INTERIOR ROOMS AWAY FROM EXTERIOR WALLS OR WINDOWS WHENEVER POSSIBLE
- DO NOT STORE COLLECTIONS IN ATTICS OR BASEMENTS
- MAINTAIN THE BUILDING ENVELOPE INCLUDING THE ROOF AND WINDOWS
- LOWER RH IN DAMP SPACES WITH PORTABLE DEHUMIDIFICATION IF NECESSARY
- STORE OBJECTS IN ARCHIVAL BOXES AND HOUSINGS TO BUFFER FROM FLUCTUATING RH



The American Institute for Conservation (AIC) recommends maintaining temperatures within a range of 59-77°F, and relative humidity within a range of 40-60% for general/mixed collections. Maintaining these environmental parameters can be difficult, especially for collections located within humid or arid climate zones, or within buildings with aging or no climate control.

AIC Environmental Setpoint Guidelines for General Collections	
Temperature	59-77°F
Relative Humidity	40-60%

ADDITIONAL RESOURCES

- ^{1,2}[IPI's Guide to Sustainable Preservation Practices for Managing Storage Environments](#)
- ³[IPI's Dewpoint Calculator](#)
- ⁴National Parks Service, Museum Handbook. Part I, Museum Collections. [Chapter 4](#).
- ⁵ ICOM-CC [Declaration on Environmental Guidelines](#)
- CCI's [Environmental Guidelines for Museums](#)
- AIC's [Environmental Guidelines Wiki](#)

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