



CCAHA specializes in the treatment of art and historic artifacts on paper and provides preservation education, training, and consultation. Established in 1977, CCAHA is the largest nonprofit conservation lab in the country.

Light Exposure of Artifacts on Exhibition CCAHA GUIDELINES

Light is a common cause of damage to collections. Cumulative over time, visible and ultraviolet (UV) light cause irreversible damage and can cause not only fading, but weakening, discoloration, and brittleness in paper, leather, and adhesives. Damage caused by light can be mitigated by controlling the intensity of light and amount of UV light artifacts are exposed to. When artifacts are placed on exhibition, steps should be taken to ensure that light exposure is controlled, monitored, and recorded.

Visible light is measured in terms of lux. A lux is equal to 1 light unit (lumen) per square meter. The exposure of an artifact to light is typically stated in terms of lux hours:

$$\text{Illumination Level (lux)} \times \text{Number of hours/day} \times \text{Days} = \text{lux hours}$$

Following this formula, the exposure of an artifact can be calculated. If an exhibit case is typically dark with occasional illumination, the exposure can be calculated according to the following example:

$$\begin{aligned} &5 \text{ minutes (.083 hrs.) of illumination of 50 lux (5 footcandles) 10 times in one day equals 41.5 lux hours.} \\ &50 \text{ lux} \times (0.083 \text{ hrs} \times 10) \times 1 \text{ day} = 41.5 \text{ lux hours} \end{aligned}$$

Illumination on Exhibit

The exposure to light of an artifact planned for exhibit should be quantified.

- ❖ The exhibit case and illumination should be designed to eliminate UV light as much as possible. UV light can be eliminated from artificial light sources, since it is not visible. UV light from daylight should be minimized by positioning of the case and filtering. The standard limit of UV light of 75 microwatts per lumen should be considered the maximum allowable.
- ❖ The standard recommendation for illuminance of sensitive objects is 50 lux to 100 lux. The exhibit case design should be based on this range. The actual illuminance within the case should be measured to ensure that the exposure limits are being followed.
- ❖ The exhibit case should take advantage of strategies to minimize light exposure such as passive systems to darken the case when not being viewed. If the case is not continually illuminated, the duration of light exposure in the case should be monitored or estimated in order to plan the total exposure of the artifact.
- ❖ Transmitted light, such as exposure through a light box, should not be used.

Routine Monitoring

A schedule of regular monitoring of illumination within the exhibit case should be established.

- ❖ Dataloggers are now available to monitor illuminance, temperature, and humidity. If a datalogger is not used, the illuminance within the case should be checked using a light meter on a routine basis. The UV exposure within the case should be tested annually.
- ❖ Blue wool standard test cards should also be used within the exhibit case as a monitor of the actual fading.
- ❖ The artifact should be tested for fading with a spectrophotometer on a routine basis depending on the duration of annual exhibition.
- ❖ A permanent record of light exposure for the artifact should be established. This record should be updated for each exhibition of the artifact in order to monitor the lifetime exposure of the artifact.

Guidelines for Light Exposure for Light Sensitive Artifacts

Very Light Sensitive, High Priority Objects*

Total exposure per year - 5,000 ft-candle hours (50,000 lux hours)

Rest for 3 years minimum between display cycles.

- ❖ Any combination of light level and intensity which gives the maximum exposure or less may be used.
For example: 5 ft-c x 10 hr/day x 100 days = 5,000 ft-c hrs
10 ft-c x 10 hr/day x 50 days = 9,000 ft-c hrs
- ❖ One footcandle (ft-c) equals approximately 11 lux.

Moderately Light Sensitive*

Total exposure per year - 10,000 ft-c hours (100,000 lux hours).

Rest for 2 years minimum between display cycles.

- ❖ Any combination of light level and intensity which gives the maximum exposure or less may be used.
For example: 5 ft-c x 10 hr/day x 200 days = 10,000 ft-c hrs
10 ft-c x 10 hr/day x 100 days = 10,000 ft-c hrs
- ❖ One footcandle (ft-c) equals approximately 11 lux.

Less Light Sensitive, Paper Based Artifacts*

Total exposure per year - 30,000+ ft-c hours (300,000 lux hours).

Rest for 1 year minimum between display cycles.

- ❖ Any combination of light level and intensity which gives the maximum exposure or less may be used.
For example: 10 ft-c x 10 hr/day x 300 days = 10,000 ft-c hrs
- ❖ One footcandle (ft-c) equals approximately 11 lux.

* These standards assume that all other environmental conditions meet conservation standards: all UV light and IR radiation has been filtered out; RH at or below 45-50%; air contaminants filtered out. Sealed frame packages for loaned items recommended to minimize exposure to high or fluctuating RH in transit.