

Lighting for Exhibitions

What causes the damage?

We have all seen the damaging effects of light, not only on collection items, but also on ourselves, it doesn't take long to get burnt in the Australian sun. Light can be split into a range (spectrum) of wavelengths. At the high energy end of the spectrum is ultra violet (UV) radiation, at the low end is infra red radiation. It is the ultra violet radiation which causes the most damage to collection items. However, over time, any light source will cause damage.

The most obvious damage caused by light is fading which will effect organic materials, particularly those which are painted, dyed or coloured including textiles, water colours, prints, photographs, coloured timbers, manuscripts and plastics. As well as causing fading UV light can induce damaging chemical reactions within the structure of some materials. This is particularly the case with plastics and acidic paper whose degradation is accelerated by UV light. While infra red light is less damaging, it does give off more heat which needs to be taken into account.

There are three factors to consider when understanding light damage-

- The amount of ultra violet light in the light source
- The intensity of the illumination (how bright the light is)
- The amount of time the item is exposed to the light source

Ultraviolet light (UV) is measured in microwatts per lumen ($\mu\text{w}/\text{lumen}$). The amount of UV light will depend on the light source being used. Generally speaking daylight has a high UV component, halogen and fluorescent lights have a substantial UV component while tungsten *and incandescent* lights have virtually no UV. With sensitive materials it is recommended that UV levels are kept below 75 $\mu\text{w}/\text{lumen}$.

Light intensity is measured in lux (lumen/square metre). The more intense the light, the higher the lux level. Lux levels are reduced as the light source moves further from the item being lit. With sensitive materials such as water colours and textiles, it is recommended that light levels are kept below 50 lux. With items of medium sensitivity such as oil paintings and ivory, it is recommended that light levels are kept below 200 lux.

The amount of time an item is exposed to light will directly effect its rate of deterioration. For example, a photographic flash, or the flash from a photocopier produces a very high light level. However, as the item is only exposed for a second or less, the amount of damage from one flash photo is minimal. On the other hand, an item on constant exhibition for ten years at 50 lux will probably show some signs of deterioration. When thinking about the amount of time items are exposed to light, you need to think about your opening hours and also any other times the exhibition areas are lit such as for openings, receptions or research time. One of the advantages many smaller cultural bodies have over larger institutions is that the shorter opening hours mean that collection items are exposed to light for shorter periods of time.

Categories of Sensitivity

Level of Sensitivity	Types of Material	Maximum lux level
Very light sensitive	<ul style="list-style-type: none"> • Paper (prints, drawing, manuscripts) • Watercolours, gouache and pastels • Photographs and films • Vegetable dyed material • Parchment and vellum • Textiles • Plastics and rubbers • Natural history specimens • dyed leather 	50 lux
Moderate sensitivity	<ul style="list-style-type: none"> • Oil, tempera and acrylic paintings • Timber • Bone, ivory and horn, • Undyed leather • Archaeological materials • Oriental lacquer (Urushi) • Painted or lacquered metals 	200 lux
Insensitive	<ul style="list-style-type: none"> • Metals • Stone • Ceramics • Glass 	although light levels are not an issue, it is suggested that an upper level of 1000 lux is used indoors

Lighting Control

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Good lighting is a necessity for any exhibition, however, light can cause damage to collections. There are a number of solutions which can be explored when looking at the best way to control light in the exhibition space.

- Reduce daylight- Apart from the damage caused by the high UV component of sunlight, it creates difficulty in controlling light levels as the intensity will fluctuate continuously depending on the time of day, time of year and whether it is overcast. Daylight can be controlled using heavy curtains, diffusing blinds, exterior shutters, UV filtering material applied to windows or attaching boards to the windows.
- While halogen lights do have a UV component they are generally supplied with UV filters (although this should be checked prior to installation). Similarly, there are low UV output Fluorescent lights available and UV filtering shields which can be placed around the tube.
- Perspex will provide a degree of UV filtering and can be used to provide a further degree of protection for framed watercolours and prints or items within Perspex display cases.
- Dimmers can be fitted to light switches to further reduce light levels.
- Design your exhibition space so that light levels are slowly reduced as people move through the space. This will give people's eyes time to adjust to lower light levels. For example the visitor may enter a foyer at 500 lux, move through to a general exhibition area of 200 lux and finally to an exhibition of illuminated manuscripts at 50 lux.
- Use movement switches or timers to control the amount of time vulnerable material is lit. A more traditional approach is to place heavy cloth over display cases which the visitor lifts up to look at the exhibition.
- Limit the amount of time vulnerable material is on display. Many galleries and museums put limits on the amount of time vulnerable material is on display. For example they may suggest that a watercolour should only be on display for three months per year. This does not necessarily mean that the item can only be displayed for three months but that if it is on display for a year it should not be displayed for the next three years.