

TECHNICAL BRIEF

Fading

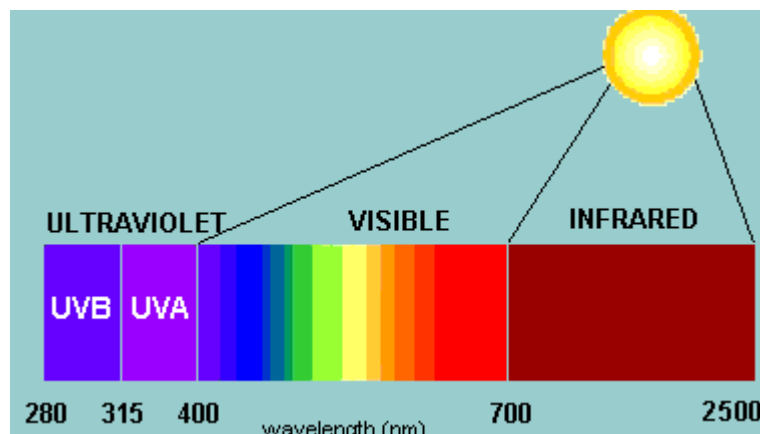
Fading of home furnishings such as fabrics, paintings etc is a due to chemical degradation of the organic molecules that make up the pigments and dyes in these materials, and often even the materials themselves.

The degradation process is affected by the following factors:

- High temperature
- Humidity
- Sunlight, wavelengths over range of 300 to 600 nm (nanometers)

While each of these three factors are known to influence the degradation rate of organic molecules. The majority of fading results from the absorption of sunlight passing through windows and doors. The spectral region, which results in fading is 300nm to 600nm. These wavelengths cover both the ultraviolet region as well as the majority of visible light reaching the earths' surface.

Wavelengths Of Sunlight At Ground Level



How can I prevent my furnishings from fading?

There are two methods by which the severity of fading can be reduced; positioning and protection.

Protection

Protection can take two different forms. Firstly by installing blinds or curtains in the window / doorways it is possible to reduce the volume of direct sunlight that enters a dwelling. It also tends to ensure that the majority of light that enters the building is of a diffuse nature (particularly if weaved curtains are used). Consequently the amount of light directly striking furnishings etc between 300-600nm will be much reduced. The drawbacks of this solution are that the blinds or curtains will degrade over time and the amount of natural light entering the room will be much reduced.

The other form of protection is to select glazing materials that specifically reduce or prevent the regions of light harmful to organics from passing through them, ie. the glass acts as a selective filter. The glass can be chosen so that it inherently reduces the amount of light that passes through it between 300 –600 nm while still allowing a relatively large proportion of natural light to enter the room. This method allows a large proportion of natural light to enter the home or office while still providing protection for its furnishings and curtains etc.

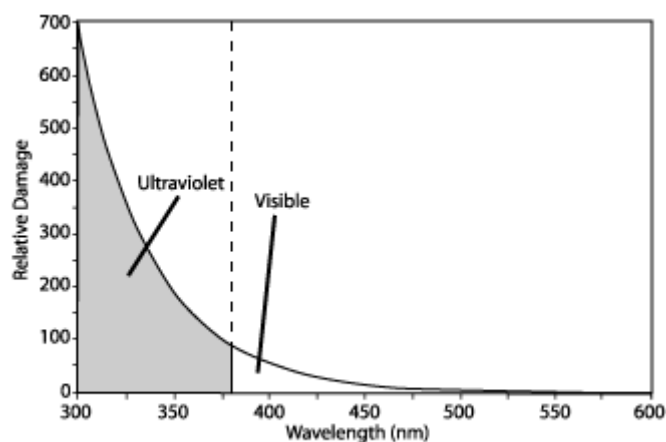
Position

As direct sunlight causes more fading than diffuse sunlight. It may be possible to arrange the furnishings so that direct sunlight is prevented from falling onto them. Positioning is a somewhat simple, but never the less an effective method of reducing fading and should always be considered.

How can I tell how effective a glass will be at preventing fading?

While it is extremely difficult to estimate the exact wavelengths that will lead to the degradation of a particular furnishing, it is well known that the sensitivity of organic materials to degradation decreases as the wavelength of the light striking them increases.

Diagram of General Sensitivity of Organic Molecules To Fading (Degradation)



*This plot is a general trend of susceptibility. Each organic material absorbs a slightly different distribution of light from all other organic materials. Organic molecules absorption characteristics are sometimes known as its "fingerprint".

A number of different methods have been developed to evaluate the fading potential of the light passing through glass.

They include:

- UV damage weighted transmittance (Tdw – ISO/ CIE)
- UV transmittance percentage (Tuv)
- Krochman Damage Function (Tdw-K)

The most widely accepted of these methods is the **UV Damage Weighted Transmittance (Tdw – ISO/ CIE)**. This system is a numerically based weighting system, which was developed by both the International Standards organization (ISO) and the International Commission on Illumination (CIE). This system attempts to evaluate the fading potential of all light between the spectral range of 300-600nm passing through glass.

Less widely used are both the UV transmittance percentage (Tuv) and Krochman Damage Function (Tdw-K). The UV transmittance percentage (Tuv) of a glazing is a simple unweighted average of the ultraviolet light passing through the glass. It does not include the visible light component in its evaluation.

The Krochman Damage Function (Tdw-K) however, is a calculation procedure rather similar to that used to derive the Damage Weighted Transmittance (Tdw- ISO/CIE). The difference between the two methods is the distributions used to evaluate the fading resistance of the product.

G.James is able to provide advice on all your glass options along with their corresponding Damage Weighted Transmittance (Tdw- ISO/CIE).