

4th annual SHARE UCM Collections Care conference

Glossary of Light Terms

Light basics

Electromagnetic spectrum: a continuous range of waves with different energies. The shorter the wavelength the higher the energy, and the longer the wavelength the lower the energy. The transmission of this energy in form of waves is called electromagnetic radiation.

Wavelength: the distance between a point of one wave and the same point of the next wave. Light consists of wavelengths. The wavelength that the object reflects back to our eyes is the colour we perceive. The shorter the wavelength, the higher the energy emitted.

Visible Spectrum: the portion of the electromagnetic spectrum that is visible to the human eye. This range is 390 to 700 nm (nanometres).

Blue Sky: the clear sky opposite to the sun at midday. In the northern hemisphere, it would be the sky on the north side when the sun is on the south side.

Ultraviolet light: the electromagnetic radiation with a wavelength of 10nm to 400nm. It has a shorter wavelength than visible light but higher energy. It is not visible to the human eye.

Light emittance concepts

Illuminance: the light illuminating a given surface. The relationship between light intensity and surface area are measured in lux.

Luminous emittance: the light reflected from a particular surface.

Spectral Power Distribution (SPD): a graph of the amount of power a light contains at each wavelength in the visible spectrum.

Colour rendering index (CRI): a scale of 0 to 100 that indicates the ability of a light source to faithfully reveal the colours of various objects. Natural light is often thought of as the ideal CRI.

Colour temperature: the tint of a particular light. For example, candlelight is reddish while midday sunlight has a blue tint. The colour temperature is expressed in Kelvin or K.

Correlated Colour Temperature (CCT): a measure of colour appearance of a light emitted by a lamp. CCT generally rates lamps as warm when the rating is below 3200 K and cool when is above 4000 K.

Chromatic colour: any colour that has the slightest hue. There are only three achromatic colours: white, grey and black.

Colour consistency: the average of the chromatic variation that exists between a batch of supposedly identical lamps.

Spectrometer: scientific instrument that can split lights in a range and array of colours corresponding to the visible spectrum.

Measurement of light

Luminous flux: the measure of the perceived light. It is expressed in lumen.

Lumen: a unit of light produced by a light source. It is an SI derived unit of measurement (based on the International System).

Lux (lx): the SI measurement unit that indicates the illuminance. A unit of lux corresponds to a lumen per square meter.

Candela: the luminous intensity of a light source in a single given direction, whereas lumen measures it in all directions. In other words, how far you can be whilst still being able to see the light source.

Luminance: the intensity of light emitted from a particular surface in one direction. The SI unit for luminance is candela per square meter.

Foot-candle: the measurement unit of light intensity given by a candle on a surface one foot away. The measurement unit is not part of the International System of units (SI).

Cumulative dose: the total dose of light and ultraviolet light that is given to a surface or object over a period of time.

The following formula has been developed to calculate the cumulative doses of illuminance that an object receives. It allows for calculating the period of time an object can be illuminated before light damage occurs:

$$E/L = T_M$$

E = Estimated lux hours
L = Measured incident lux
T_M = Total hours

The resulting T_M should be under the exposure recommended for a particular type of object found in the published standards “PAS 198:2012 Specifications for Managing Environmental Conditions for Cultural Collections” (British Standards Institutions, 2012).

Light documents for collections

PAS 198:2012: Publicly available specification that collects the British Standards on setting environmental conditions for the care of cultural collections in the UK.

PD: published document which contains supplementary information to the specifications. It is not a standard and contains recommendations.