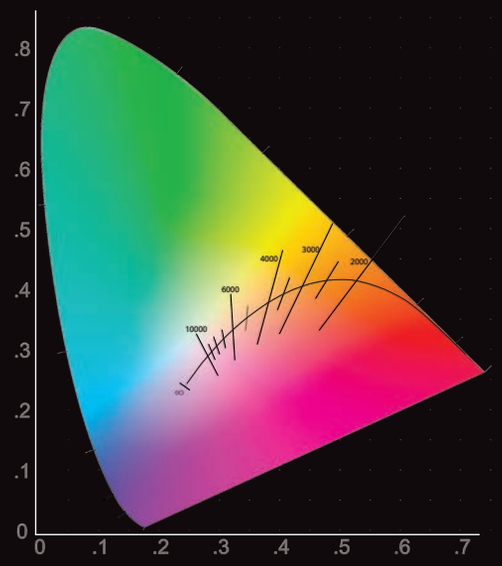
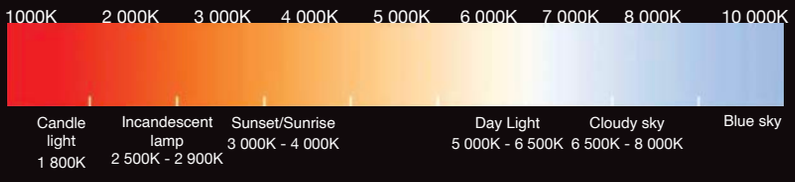


The effect of colour temperature

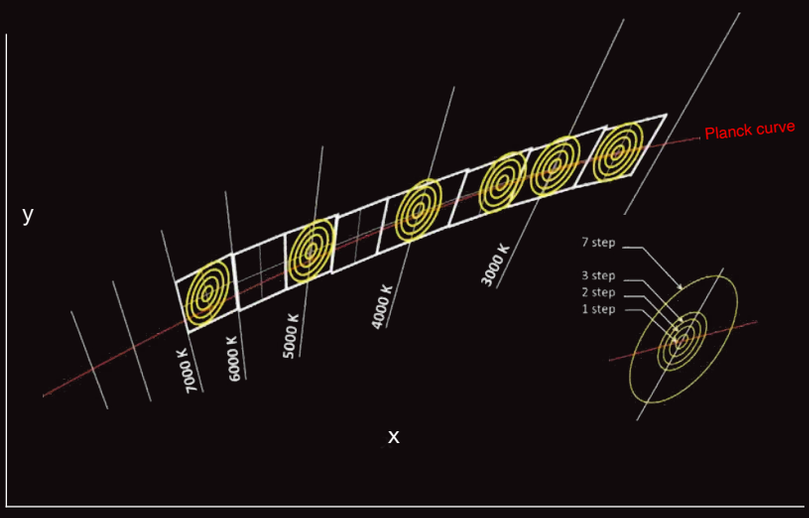
The choice of colour temperature is mainly determined by the works of art, the objects and materials needing to be illuminated. The colour outputs from LEDs vary from warm white to cool white (according to the prevailing red or blue colour shades of the light spectrum).



Scale of reference for white light expressed in degree Kelvin

What is a Macadam Ellipse (SDCM) ?

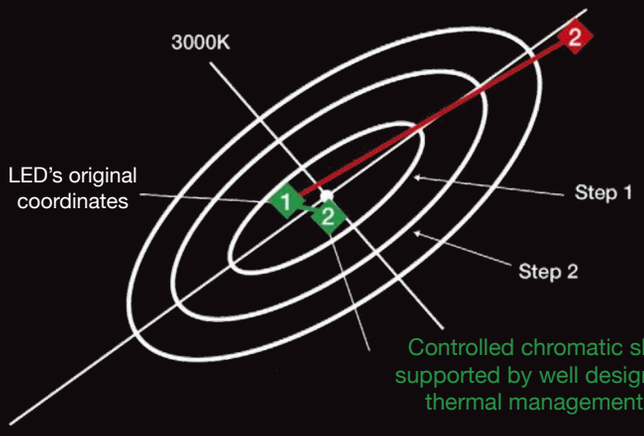
Due to the variable nature of the colour produced by white light LEDs, a convenient metric for expressing the extent of the colour difference within a batch (or bin) of LEDs is the number of SDCM (MacAdam) ellipses steps in the CIE colour space that the LEDs fall into. If the chromaticity coordinates of a set of LEDs all fall within 1 SDCM («1 step MacAdam ellipse»), most people would fail to see any difference in colour. If the colour variation is such that the variation in chromaticity extends to a zone that is twice as big (2 SDCM or a 2 step MacAdam ellipse), you will start to see some colour difference. A 2 step MacAdam ellipse is better than a 3 step zone, and so on. Steps 1 to 3 are particularly applicable for museum & gallery applications with high specifications. This precautionary measure avoids any colour differences between the output of identical light fittings.



LED chromatic shift in use. Visible colour variation. Failing thermal management.

What about chromatic shift ?

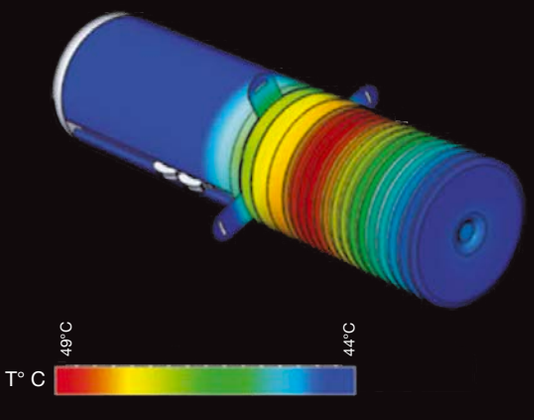
The importance of chromaticity shift phenomenon depends on the quality of the thermal management of the LED.
An undersized or confined heat sink will inevitably lead to a shift in the colour output quality (see photo), as well as a reduction of the lumen output and, consequently, an early product failure.



Controlled chromatic shift supported by well designed thermal management.

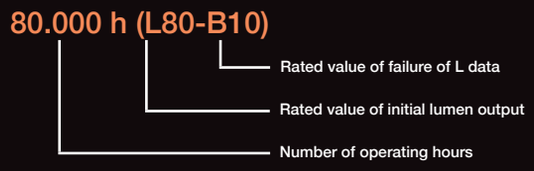
Thermal management control for LED efficiency and colour consistency

SPX LIGHTING uses a dedicated thermal simulation software that allows an optimum thermal management solution for the LED lightsource (Tj). This prevents any shift in chromaticity and insures complete consistency of the colour quality of the light output over the lifetime of the luminaire.
This is a fundamental feature on all SPX luminaires !

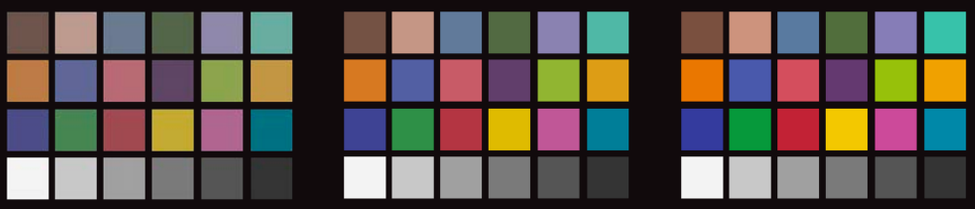


Lifetime and failure rate

Sustainability of a light fitting is based on 3 main criteria :
Operating time measured in number of hours (Hrs), a maintained lumen output (L), and failure rate (B).
Example : L70-B50 means 70% of the lumen output is maintained with a failure rate of 50%. L70-B10 limits the failure rate to 10%.



The lifetime of the Led MUST ALWAYS be associated to the maintained lumen output and to the failure rate value. By definition, if B value is not indicated, the default value is B50.
A 10°C variation on the junction of the LED highly affects the failure rate from 10 to 50%.



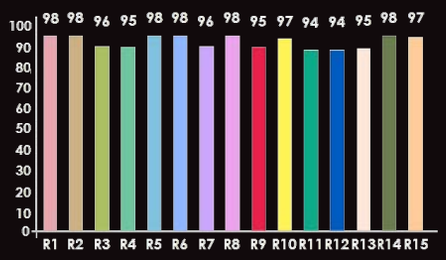
What is the definition of CRI ?

The Colour Rendering Index measures the ability of a light source to accurately reproduce the colours of the object it illuminates. The CRI is rated on a scale from 0 to 100.

CRI calculation methods

There are several methods used to calculate the rendering index.

* CRI (Ra) based on 8 samples from R1 to R8
* CRI (Re) based on 15 samples from R1 to R15
* TM30-15 based on 99 samples



TM30-15

The index (Ra) developed by the CIE, based on 8 reference colors and on two types of illuminants (daylight and black body emission), does not make it possible to discriminate hue or saturation, that are clearly perceptible to the eye.
The IES TM30-15 method also introduces a second «Rg» index representing the overall difference in hue and saturation of each of the 99 color samples.