Colour temperature
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Topic: Educational Lighting Site

So far we have dealt with choice criteria that are more connected with the quantity rather than the quality of the light emitted by a source. But to illuminate a room not only requires a preventive examination of a series of technical-economic parametres, nor can a lighting project be reduced to a mere problem of optimization of installation and cost efficiency and control.
The common knowledge that artificial light, widely used by now in the built habitat, conditions visual perception processes involving the health and welfare of its inhabitants, has led the major lamp manufacturers to raise the qualitative level of the luminous emission in the search of more appropriate solutions to each problem related to indoor illumination. In order to appropriately estimate the quality of light we recur to some quantities that express its chromatic content. As we have seen, any light source, either of solid or aeriform nature, generates visible electromagnetic radiations included inside the ? interval from 380 to 780nm. The division of radiations in the visible spectral range determines the colour of light, or better its value. According to an international convention established by the CIE, the value is directly expressed, by comparison, through a thermal quantification, that is absolute temperature, expressed in Kelvin degrees (K), of a blackbody which radiates light in the same value as the light emitted by the source taken into consideration. Such reference temperature is called colour temperature.

To say that a lamp has a colour temperature of 3000 K means that the light it produces has the same value as the one generated by the blackbody brought to a reference temperature of 3000 K. The definition is sufficiently appropriate when we analyze the value of the light originated from a solid body which, in the same way as the blackbody, has a continuous emission spectrum. In the case of the lamp with a tungsten incandescent filament the temperature necessary to equal the value of the blackbody is higher because W does not have the same energy spectral division of the blackbody. The identical values of the two emissions do not correspond to the same distribution of the ?s. Thus we can understand how the colour temperature may define the value only in an approximate way, as a chromatic effect rather than as a chromatic identity.

When we examine, then, the value of a discharge lamp which - as we know - has a discontinuous spectrum, or anyway marked disuniformities between the ?s, the comparison with the blackbody becomes meaningless. However, it is still common use to talk about colour temperature, sometimes with the definition of correlated temperature, by referring to the temperature of the blackbody which produces a chromatic result as near as possible to the discharge source. Finally, we must bear in mind the fact that the thermal quantification only describes, and briefly, the value of the luminous emission and not its colour representation, i.e. the propriety of faithfully return, by reflection, the colours of the illuminated objects.

Sources	*Colour temperatures*
Clear sky	**20000 - 15000**
Vercast sky	**15000 - 5000**
Midday sun	**5250**
Sun at dawn	**1600**
Incandescent lamp	**3000 - 2400**
Fluorescent lamps	**6500 - 2900**
Tallow candles	**1900 - 1800**

The table contains the values of the colour temperatures of some natural and artificial light sources. For example 2.000 °K are equal to 1.727 °C