Color

correlated color temperature

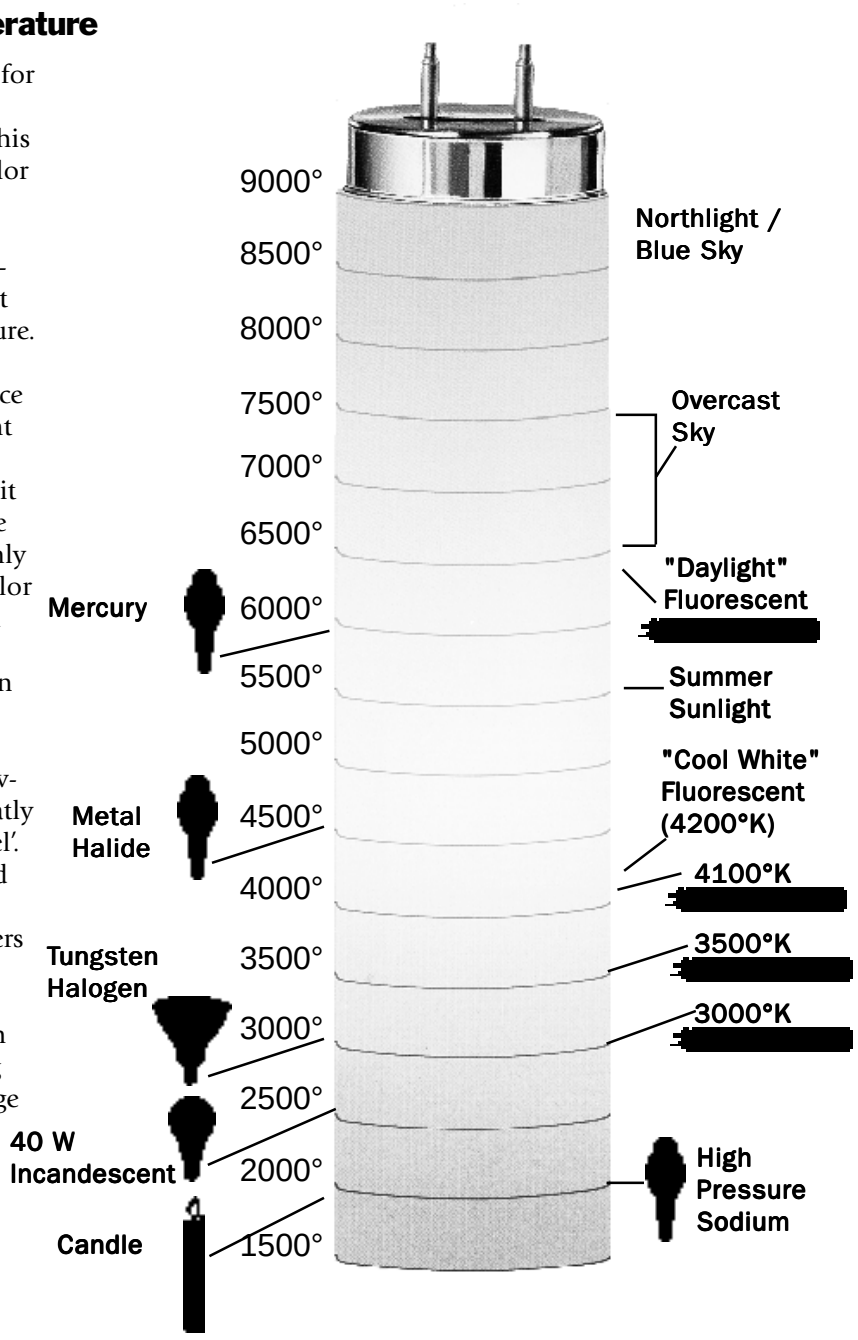
Electric light sources are rated for visual color appearance in degrees Kelvin, i.e., 3000°K. This rating is called 'Correlated Color Temperature' (CCT). This is a relative comparison with the color given off by an incandescent tungsten lighting filament when heated to that temperature.

This makes it possible to create a standard color reference for describing the color of light from a lamp. When a lamp is designated as being '3000°K', it does not mean anything in the lamp is that temperature. It only means the light is the same color as an incandescent filament at that temperature.

Electric lights now come in CCTs ranging from 1900°K to 20,000°K. Choosing a CCT is partly design, and partly behavioral science. CCT choices greatly influence how a space will 'feel'.

Lower CCTs have more red light, while higher CCTs have more blue light. Some designers may refer to redder sources as 'warm', and bluer sources as 'cool', causing some confusion

At right is a chart showing comparisons of CCTs of a range of light sources.



color rendering index (cri)

'Color rendering' (CRI) describes the effect a light source has on an object's color. Light sources with low (poor) CRI will distort or wash out colors. Higher CRI light sources will show a fuller color depth of the object. In most cases, CRI is a scale from 50 to 100. When CRI was invented, 'warm white' fluorescent lamps were the bottom of the scale, and incandescent sources were the top.

In rating a lamp for CRI, reference colors are viewed under a light source, and the distortions in the reference colors are measured. These distortions are used to create an overall rating of color accuracy for that light source, in relation to other light sources of the same Correlated Color Temperature (CCT). CRI comparisons are not valid for lamps of different CCTs.

The higher the CRI, the lower the level of distortion of colors under the light. The CRI superiority of incandescent sources is no longer as great today as it was in the past. Fluorescent and HID sources are now available with CRI ratings at or above 95, narrowly approaching the 100 of incandescent sources.

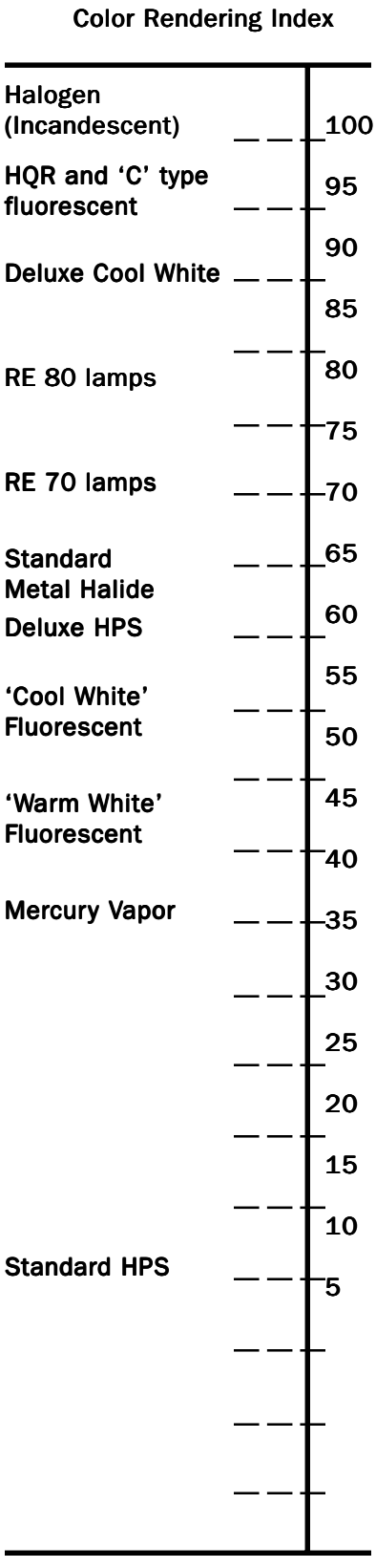
The CRI system is far from perfect — CRI comparisons between different color temperatures are not technically meaningful. Shortcomings of a light source are not included (for instance, the 100 CRI of incandescent is noticeably lacking in blue frequencies). Choosing, and especially matching, colors can become a tremendously complicated process.

At the deepest levels of inquiry into the nature of color qualities, there are few straightforward answers to some questions. The color that you 'see' is produced by the interaction of 3 variables:

- The color frequencies in the light falling on an object
- The color qualities of the object. (What light frequencies does the object reflect, and which does it absorb?)
- How well the observer's visual system processes and interprets color (Are you capable of discerning color?)

As a general rule, lamps that provide very high levels of color accuracy have traditionally done so at the cost of energy efficiency. One of the breakthroughs of rare earth phosphor lamps (such as compact fluorescent and T-8's) is that they not only provide high lumens per watt performance, but very good CRI as well. Plus, research indicates that higher CRI (RE80 and RE90) lamps provide greater task visibility than lower CRI lamps.

The most fundamental advice on color temperature and CRI is — pick the most flattering (or suitable) color temperature for your space, and then buy the highest CRI lamp in that color temperature that your budget can afford.



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