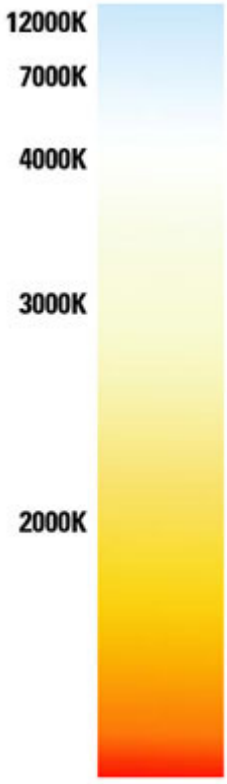
Understanding Lighting Colors and Light Output

"Warm," Cool," Daylight," etc.

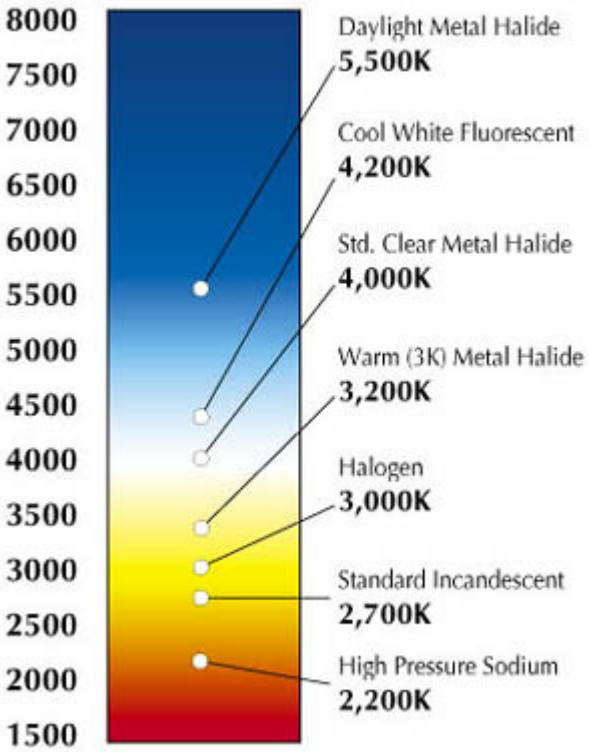
Yellowish white light, reminding people of a fireplace, is called "warm" while bluish white light is called "cool." These are based on associations with these colors. "Daylight" is supposed to mimic light coming in from a window. These are crude, but useful classifications. However, we can have differing degrees of "cool" and "warm": and therefore we need a quantitative measure, the Correlated Color Temperature, described below.

Correlated Color Temperature (CCT) measured in Kelvins (K)



Correlated Color Temperature (measured in Kelvins)-or simply Color Temperature-is a scientific scale to describe how "warm" or how "cool" the light source is. It is based on the color of light emitted by an incandescent source. As a piece of metal (a theoretical Blackbody) is heated, it changes color from reddish to orange to yellowish to white to bluish-white. The color of light emitted by an incandescent object depends only on the temperature. We can use this scale to describe the color of a light source by its "Color Temperature."

When we say a lamp has a Color Temperature of 3000 Kelvins, it means a glowing metal at 3000 Kelvins would produce light of about the same color as the lamp. Instead, if the metal is heated to 4100 Kelvins, it will produce a much whiter light. Direct sunlight corresponds to about 5300 Kelvins while daylight, which has the blue from the sky mixed in, is typically 6000 Kelvins or above. A standard incandescent lamp has a filament at 2700 Kelvins, and therefore (by definition) a Color Temperature of 2700 Kelvins.



Lumens Vs. Watts Output

We often tend to think of a light bulb's brightness in terms of watts, because we have used the same kind of bulb---incandescent---for more than a century. But this is misleading. Watts measure the amount of electrical power that a light bulb consumes, but do not directly indicate the brightness of the light that the bulb emits. Brightness is in fact measured in lumens.

Why It Matters

- As new types of bulbs move onto the market, it becomes more and more important to base buying decisions on output in lumens rather than energy consumption in watts. Fortunately, though, we can expect that as long as traditional incandescent bulbs remain available, marketers will continue to describe the light output of other kinds of bulb, such as compact fluorescents and LEDs, in terms of the light produced by an incandescent bulb of a particular wattage.

What is a Watt?

- A watt is a unit of power. According to Dictionary.com, it is "equivalent to one joule per second and equal to the power in a circuit in which a current of one ampere flows across a potential difference of one volt." In layman's terms, a watt is the

result of multiplying amperes by volts. In the case of electric light, it is the amount of power used in one hour by the bulb. A 100 watt bulb uses 100 watts of power every hour it is on, a 60 watt bulb uses 60 watts, and so on.

What is a Lumen?

- The rating of a bulb in lumens tells you, quite simply, how bright it is. The PC Magazine Encyclopedia states that "Lumens define 'luminous flux,' which is energy within the range of frequencies we perceive as light."

Lumens and Watts

- Most of us are so used to thinking of bulb brightness in terms of watts that we forget that this only works when we're talking about the same kind of bulb. A traditional 75 watt incandescent bulb will always be brighter than a 40 watt bulb. But an18 to 25 watt compact fluorescent can deliver the same brightness (1,100 lumens) as a 75 watt incandescent bulb---making it much cheaper to use.

The Marketplace

- To conserve energy, U.S and a number of European countries have banned or will soon ban incandescent bulbs from domestic use, in favor of compact fluorescent bulbs. This is because, as we've seen, compact fluorescents produce more lumens per watt---in other words they are more efficient. LED bulbs are an even more efficient technology. As these new products push aside traditional incandescent bulbs, consumers will find it increasingly useful to think in lumens rather than watts.