

## KELVIN COLOR TEMPERATURE

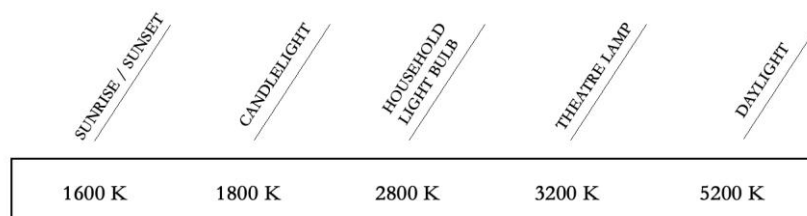
William Thompson Kelvin was a 19<sup>th</sup> century physicist and mathematician who invented a temperature scale that had absolute zero as its low endpoint. In physics, absolute zero is a very cold temperature, the coldest possible, at which no heat exists and kinetic energy (movement) ceases. On the Celsius scale absolute zero is -273 degrees, and on the Fahrenheit scale it is -459 degrees. The Kelvin temperature scale is often used for scientific measurements.

Kelvins, as the degrees are now called, are derived from the actual temperature of a black body radiator, which means a black material heated to that temperature. An incandescent filament is very dark and approaches being a black body radiator, so the actual temperature of an incandescent filament is somewhat close to its color temperature in Kelvins.

The color temperature of a lamp is very important in the television industry where the camera must be calibrated for white balance. This is often done by focusing the camera on a white card in the available lighting and tweaking it so that the card reads as true white. All other colors will automatically adjust so that they read properly. This is especially important to reproduce “normal” looking skin tones. In theatre applications, where it is only important for colors to read properly to the human eye, the exact color temperature of lamps is not so important.

Incandescent lamps tend to have a color temperature around 3200 K, but this is true only if they are operating with full voltage. Remember that dimmers work by varying the voltage pressure supplied to the lamp. When a lamp is dimmed below its full potential, its filament is not as hot, and it produces less light. The reduced temperature of the filament also reduces the color temperature downward. A theatre light dimmed to 10% is noticeably redder than one at 100%.

Arc lights such as the HMI have a much hotter color temperature, up around 5600 Kelvins, which approximates the color temperature of a sunny afternoon outdoors. Television cameras work better in this color temperature zone, and as a result TV studios often use arc-type lamps for their lighting. This practice is made more attractive for television because TV production rarely has a need to dim lights down, something that is somewhat difficult with an arc lamp. Special color correction filters are available to boost the color temperature of incandescent lamps upward into the daylight color range.



SOME REFERENCE POINTS FOR COLOR TEMPERATURE IN KELVINS