



Why Daylight?

Daylight renders color accurately

Since natural daylight changes throughout the day and with changes in the weather, the need exists to simulate daylight. Almost 100 years ago, Norman Macbeth – an illumination engineer and founder of the former Macbeth – identified the need to use simulated standardized daylight for making accurate visual color judgments. Depending on the light source, color perception varies. That's because the spectral quality or color content of the light affects how we see color. The spectral quality of natural daylight depends upon atmospheric conditions, geographic location, and time of year – even time of day. For example, the color appearance of early morning sunrise and late afternoon sunset can be as low as 2300° Kelvin (also known as horizon daylight*). At noon, the color appearance of light is approximately 5000° Kelvin and can exceed 10,000° Kelvin (on a clear day facing a north sky).

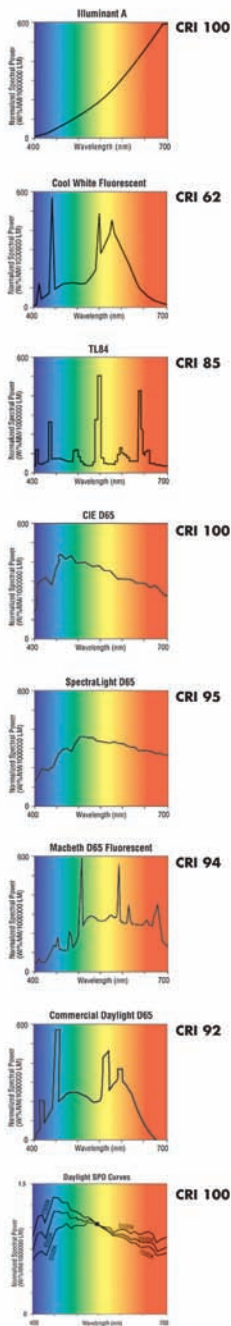


Norman Macbeth pioneered the development of accurately simulated daylight. This technology is still used today in Macbeth viewing booths which permit accurate color viewing under all phases of daylight – including filtered tungsten halogen daylight, horizon daylight, blended daylight, and the unique 7-phosphor fluorescent daylight. Macbeth lighting products provide accurate simulation of daylight and can be used anywhere at any time to perform consistent color evaluations. This is especially true for products that utilize optical brightening agents.

*unique to Macbeth SpectraLight

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Does High Color Rendering Index (CRI) Mean Accurate Color Rendering?



The Seven-Phosphor Advantage

If you were to evaluate a red jacket under incandescent or home lighting, it would appear to be a warmer red than that same jacket viewed outdoors. This would lead you to believe that colors viewed in home lighting aren't necessarily representative of the true color. This is because incandescent light, Illuminant A, is high in red and yellow energy but low in green and blue. Daylight, on the other hand, contains more evenly balanced amounts of all colors making it a better choice for color rendering. Yet both light sources could theoretically have the same color rendering index (CRI).

That's what could happen when light sources are selected based on CRI alone. Why?...CRI (calculated by lamp manufacturers) compares the light source to be evaluated against an arbitrary reference. Depending on the color temperature of the light sources being tested (say under 5000 degrees Kelvin), the arbitrary reference would be a Planckian radiator similar to tungsten halogen or home lighting. This light source accents reds, oranges and yellows while weakening blues and greens. So your arbitrary reference, assigned a CRI of 100, is already poor at rendering color. When the light source compared is 5000 degrees Kelvin or greater, it is compared to a phase of daylight (which renders color more accurately) instead of tungsten halogen which has the highest CRI, yet poor color rendering capabilities.

What can you do? Ask your lamp supplier for the spectral power distribution curves (SPD). The curves display the amount of color energy within a light source. So the more evenly balanced the curve across the visible spectrum (red, orange, yellow, green, blue, indigo and violet or ROY G BIV), the better the light source renders color. If, however, the curve is higher in some areas of the spectrum, as is the case with incandescent, which has high red energy and little blue/green energy, the greater the distortion of color — regardless of the CRI.

The unique seven-phosphor coating on the Macbeth fluorescent daylight technology provides the best daylight simulation available in a fluorescent source. Several independent studies have confirmed this. The coating ensures an evenly balanced spectral power distribution curve. So you'll get a high CRI and accurate color rendering compared to natural daylight. Macbeth uses the CIE Assessment of Daylight Simulators, CIE Publication 51. This is a far more accurate method of determining the quality of a daylight simulator.

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