BACI BY REMCRAFT

Color & Light 101

Lighting in BACI and Echo Mirrors

Most Baci and Echo mirrors use LED light sources while a few Echo mirrors still use incandescent lamps for their light source. Generally our LED mirrors offer the following advantages:

- High light output
- Natural white light
- Accurate color rendering
- Energy efficiency
- Long life
- Operate on universal voltage

Light Output

The amount of light from a light source is usually measured in Lumens. A simplified technical definition of a lumen is the total amount of visible light emitted by a source. To offer a familiar reference point, a typical 25 watt incandescent light bulb emits about 230 lumens.

Light sources in Baci and Echo mirrors emit the following amounts of light

High power LED's	615 lumens	Baci Junior Mirrors
Medium power LED's	342 lumens	Baci Classic Mirrors
Low power LED's	260 lumens	Echo Mirrors with LED lighting
Low power incandescent	120 lumens	Echo Mirrors with Incandescent lighting

Natural White Light

LED's and other light sources can produce light in a wide range of colors, however, for make-up mirrors we're primarily interested in white light. But, as you've probably discovered, there are many colors of "white light" ranging from the soft warm glow of a candle to the bright blue/white of some automotive headlamps.

The color, or hue, of light is referred to as its Correlated Color Temperature (CCT) and is usually measured in degrees Kelvin. In technical terms CCT is roughly the color of a block of carbon heated to a specific temperature on the absolute (Kelvin) scale. For example, the color temperatures of some common light sources are:

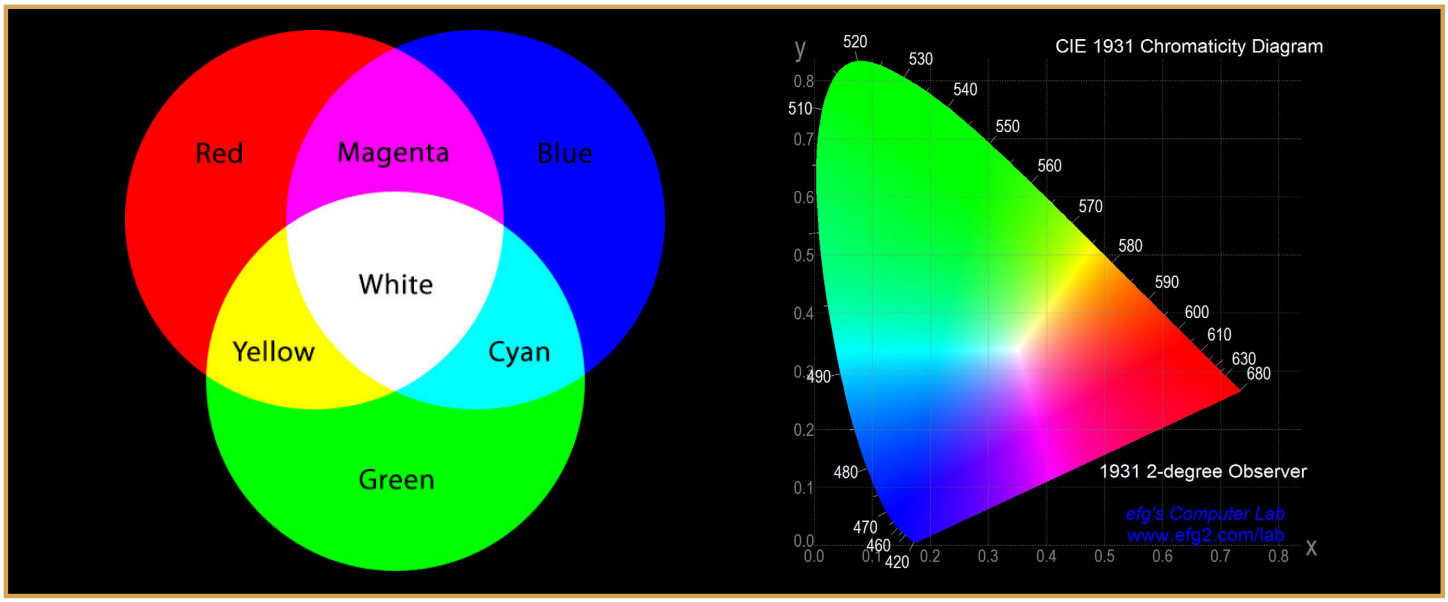
40 watt incandescent lamp	2500° K
Cool white fluorescent lamp	4200° K
Noon daylight	5500° K

Light from Baci and Echo mirrors is targeted at the following color temperatures

High power LED's	3500° K	Baci Junior Mirrors
Medium power LED's	3200° K	Baci Classic Mirrors
Low power LED's	5000° K	Echo Mirrors with LED lighting
Low power incandescent	2500° K	Echo Mirrors with Incandescent lighting

Since our environment includes incandescent and fluorescent lighting as well as all sorts of daylight we tend to perceive color temperatures between 3000° K and 4000° K as natural. Thus the light from a Baci Medium or High Power LED mirror provides undistorted, natural illumination for the user.

Most colors of light can be produced by mixing various amounts of Red, Blue and Green light as seen in the charts below. The chart on the left shows that combining red, green and blue light produces white light. Variations in the intensity of each component produce the many different shades of white that we see. The chart on the right shows a range of colors produced when various proportions of red, green and blue light are mixed. Note that white light is only seen in a small area near the middle of the chart.



Accurate Color Rendering

The CCT describes the color of light emitted by a light source. But we also have to look at another number to consider how that light makes things look. That number is the Color Rendering Index or CRI. It is an indication of how natural things look under light from a specific light source compared to how they look under daylight.

Overall, light is made up of a spectrum of wavelengths and intensities and different light sources contain different spectrums. That can be true even when the color (CCT) of the lights appears to be the same. We perceive objects based on the spectrum they reflect to our eyes. So when an object is illuminated by sources with different spectrums it will look somewhat different under illumination from each source.

CRI is a means to evaluate these differences. CRI is computed from a measurement of how several specific color samples look under light from the source being tested compared to how they look under light from a reference source with the same color temperature. If you compare the CRI's of two light sources with the same CCT the one with a higher CRI will render colors more naturally.

But remember that the CRI is only meaningful when you're comparing light sources of the same CCT. For example both an incandescent lamp and natural sunlight have a CRI of about 100. But the incandescent lamp has a CCT of about 2500° K vs. the 5000-6000° K of the sunlight and an object seen under the incandescent illumination will look yellower than one seen in sunlight.

Typical high power LED's in the 3000° K to 4500° K range have CRI's of 70 to 80. Baci medium and high power LED mirrors have a minimum CRI of 80 which is one of the highest available in comparable light sources. The IES Bathroom Lighting Guide recommends a CRI of 80 or better for applying make-up.

Energy Efficiency

LED's (Light Emitting Diodes) produce visible light by passing relatively low power electrical current through a semiconductor. Based on the chemistry and technology the LED emits visible light and some heat. Incandescent lamps produce visible light by passing higher power electrical current through a filament. The filament gets hot enough that it produces visible light and also quite a bit of heat. LED's are far more efficient than incandescent or even most fluorescent lamps, producing more light and less heat while consuming less energy.

Efficiency in Baci and Echo mirrors is as follows:

High power LED Mirrors	615 lumens	9 watts	72 lumens per watt
Medium power LED Mirrors	342 lumens	5 watts	68 lumens per watt
Low power LED Mirrors	260 lumens	3 watts	93 lumens per watt
Low power incandescent Mirrors	120 lumens	15 watts	8 lumens per watt

Long Life

LED's tend to have very long lives in comparison to incandescent lamps. Typically individual high power LED's have an average life of as much as 50,000 to 100,000 hours where the incandescent lamps in Echo incandescent mirrors have an average life of about 1000 hours. In either case consider that a make-up mirror would likely be used for an hour or less per day. That translates into an average of about 5 years for an incandescent light source and 100 years or more for a LED light source.

Universal Voltage

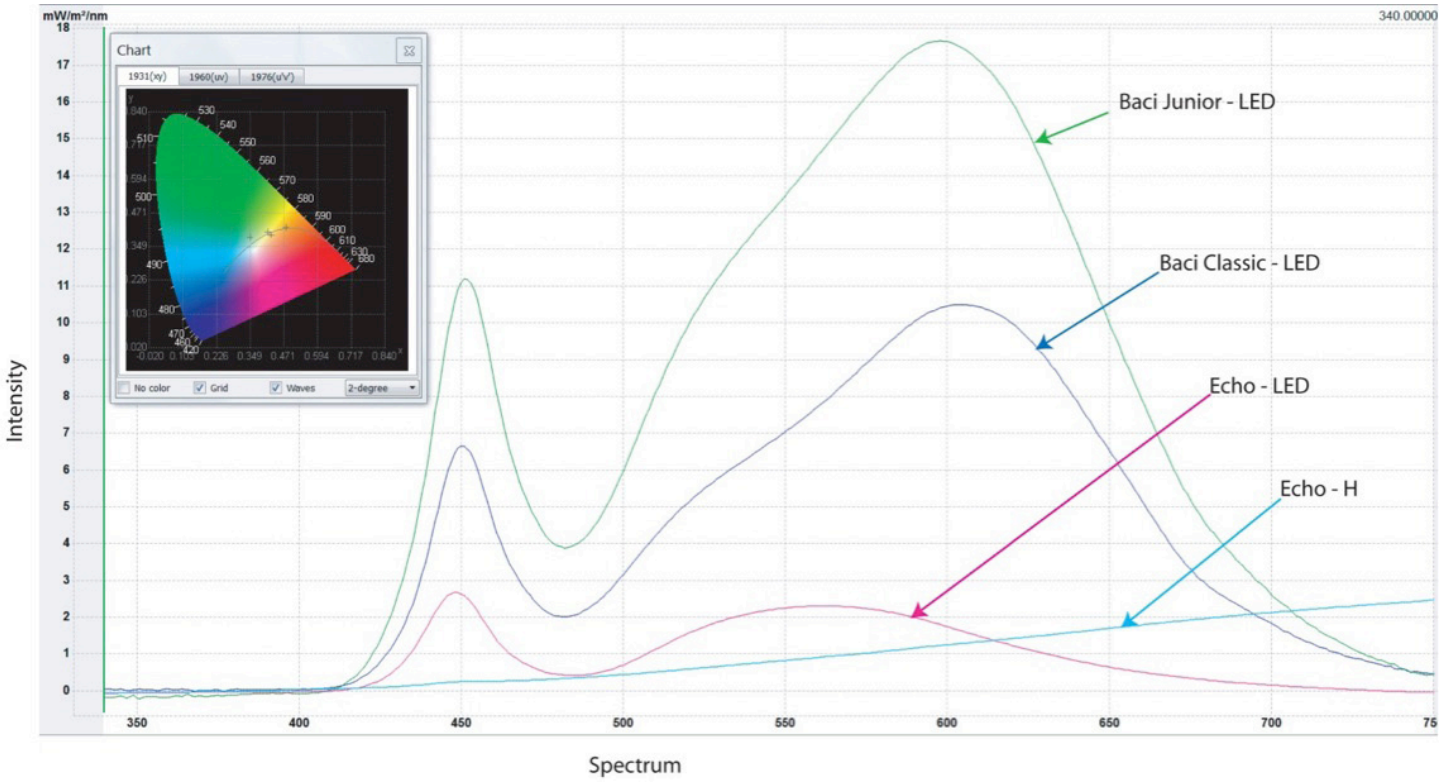
Baci and Echo LED mirrors are designed to operate on virtually all international electrical supplies. In other words, they'll work in countries like the US where the standard current is 120 Volts at 60 Hertz, or in countries like Germany where the standard current is 240 Volts at 50 Hertz or even in Japan where the current is 100 Volts and can be at either 50 Hertz or 60 Hertz.

Baci and Echo LED mirrors include an electrical device that converts the input power to the characteristics that the LED's need. These devices are not suitable for use on dimmers or some power management systems that alter the normal supply parameters. If you need to operate on one of these systems please contact us.

Echo incandescent mirrors are typically supplied for operation on 120 Volts but can also be supplied for use on other voltages on special order.

Baci and Echo mirrors furnished with a cord and plug are typically supplied with US style plugs but can be supplied with plugs for most other countries on special order.

	Product Family			
Measurement Values (Units)	Baci Junior	Baci Classic	Echo - LED	Echo - Halo
Light Output (Lumens)	615	342	260	120
CCT - Color (° K)	3500°	3200°	5000°	2500°
Color Rendering (CRI)	80 min.	80 min.	64	98
Brightness (Lux)	966	535	129	66
Relative Brightness (%)	180%	100%	25%	13%
Energy Use (Watts)	8.50	5.00	2.80	15.00
Current (Volts)	120/240	120/240	120/240	120
Efficiency (Lumens/Watts)	72	68	93	8
Average Lamp Life (Hours)	50,000	50,000	30,000	2,000



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