COLOR TEMPERATURE – Each light source has a unique color temperature that sets the appearance for the environment in which it is used. The actual color of the light that is given off from the source is represented in Kelvin and referred to as Correlated Color Temperature (CCT). A lamp can have a warm, midrange or cool appearance depending on its color temperature. These different color temperatures can set a mood, create an environment, improve a person’s disposition, influence a person’s buying habits and has even been known to affect a person’s appetite.

“Warm” light sources have a lower color temperature, usually in the 2500K-3000K range. These lamps produce more light in the red/orange/yellow spectrum. As the color temperature of a lamp increases the lamps appearance becomes “cooler.” As the lamp’s color temperature increases so does the amount of light produced in the blue end of the spectrum. USHIO America, Inc. offers lamps in a wide variety of color temperatures to suit the needs of most users and to create the best environment possible.

<table>
<thead>
<tr>
<th>Color Temperature</th>
<th>Common Color Description</th>
<th>Typical Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>2700K - 3400K</td>
<td>Warm; Warm White</td>
<td>Specialty Retailers, Restaurants, Hotel Lobbies, Residential</td>
</tr>
<tr>
<td>3500K</td>
<td>Neutral; Neutral White</td>
<td>Grocery Stores &amp; Produce Markets, Retail Stores, Bank Lobbies</td>
</tr>
<tr>
<td>4100K</td>
<td>Cool; Cool White</td>
<td>Offices, Manufacturing, Schools, Hospitals</td>
</tr>
<tr>
<td>5000K - 6500K</td>
<td>Daylight; Daylight Plus; Full Spectrum</td>
<td>Printers, Paint Studios, Art Galleries, Car Dealerships</td>
</tr>
</tbody>
</table>

COLOR RENDERING INDEX – An object on display can take on many different appearances depending on the light source that is illuminating it. A lamp has the ability to render an object’s colors differently dependent upon the color rendering index properties of the lamp. Color Rendering Index (CRI) is measured on a scale from 0 to 100. The higher the CRI value, the more natural the colors will appear. Objects displayed under lamps with high CRI (usually 80+ CRI) look more appealing to the eye. This is why merchandise in retail stores is predominately lit using high CRI light sources such as the Halogen PAR lamps.

<table>
<thead>
<tr>
<th>Applications</th>
<th>CRI Range</th>
<th>Color Rendering Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Art Galleries, Printing Companies</td>
<td>90–100</td>
<td>Excellent</td>
</tr>
<tr>
<td>Retail Stores</td>
<td>80–100</td>
<td>Very Good – Excellent</td>
</tr>
<tr>
<td>Restaurants</td>
<td>80–90</td>
<td>Good – Very Good</td>
</tr>
<tr>
<td>Grocery Stores, Hospitals</td>
<td>70–90</td>
<td>Good – Very Good</td>
</tr>
<tr>
<td>Banks, Car Dealerships, Classrooms, Offices,</td>
<td>70–80</td>
<td>Good</td>
</tr>
<tr>
<td>Manufacturing Areas, Security Lighting, Sporting</td>
<td>&lt;60–70</td>
<td>Poor</td>
</tr>
<tr>
<td>Arenas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parking Lot Lighting, Roadway Lighting, Warehouses</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ENERGY SAVINGS – These days, energy in the form of electricity is by far the largest portion of a user’s lighting expense. Over the lifetime of a lighting system, the electricity to operate the system will represent about 86% of the total costs. Obviously, if a user can reduce their energy consumption, they will reduce their costs.

The annual cost of a lighting system can be broken down into three areas (see pie chart):

1. The initial purchase costs of the lamps (3%).
2. The cost of the electricity to operate the lamps (86%).
3. The costs of labor to replace the lamps (11%).

Ushio America, Inc. understands the need for energy efficient lighting products that produce nearly the same light output (lumens) as their conventional counterparts, but consume considerably less energy doing so.
**TECHNICAL LAMP REFERENCES**

### RATINGS
- **W**: Watts
- **V**: Volts
- **kV**: kiloVolts
- **A**: Amps
- **h**: hours
- **K**: kelvin
- **lm**: lumens
- **cd**: candela
- **cp**: candle power
- **nm**: nanometers
- **CRI**: Color Rendering Index

### DIMENSIONS
- **LL**: Light Length (filament length)
- **LCL**: Light Center Length
- **C-to-C**: Contact to Contact
- **Dia**: Diameter
- **max**: Maximum
- **in**: inches
- **mm**: millimeters

All dimensions are approximate measurements in inches (in) unless otherwise noted.

### BURN POSITION
- **BD**: Base Down
- **BD/Hor**: Base Down to Horizontal
- **BU**: Base Up
- **Horiz**: Horizontal
- **H<sub>2</sub>4**: Within ±4º of horizontal position
- **H<sub>2</sub>45**: Within ±45º of horizontal position
- **H<sub>2</sub>60**: Within ±60º of horizontal position
- **Univ**: Universal 360º / Any Position

### LAMP FILAMENT TYPES

**C-2R**

**CC-2V**

**C-6**

**CC-6**

**CBar6 (CF-6)**

**C8**

**CC-8**

### ANNUAL ENERGY COST CALCULATION WORKSHEET

For fluorescent or PulseStrike™ Metal Halide lamps, be sure to use the total fixture wattage (which includes the new ballast wattage savings) to calculate your new true wattage savings.

**Step 1. Calculate the total kilowatts saved by replacing the inefficient lamps with more efficient lamps**

\[
\text{Original Lamp Wattage} - \text{Replacement Lamp Wattage} = \text{Watts Saved per Lamp}
\]

\[
\text{# of Lamps to Replace} \times \text{Watts Saved per Lamp} = \text{Total Watts Saved}
\]

\[
\text{Total Watts Saved} \div 1000 = \text{Total Kilowatts Saved}
\]

**Step 2. Calculate the total kWh per year saved by this upgrade**

\[
\text{Total Kilowatts Saved} \times \text{Hours Used per Day} \times \text{Days Used per Week} \times \text{Weeks Used per Year} = \text{Total kWh Saved per Year}
\]

**Step 3. Calculate the total energy costs saved per year by this upgrade**

\[
\text{Total Kilowatts Saved per Year} \times \text{Your Energy Cost per kWh (typically $0.10)} = \text{Total Energy Cost Savings per Year}
\]

**Step 4. Compute the payback of the upgrade**

\[
\text{Initial Cost of Lighting Upgrade} \div \text{Total Energy Cost Savings per Year} = \text{# of Years for Payback on Investment}
\]

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<table>
<thead>
<tr>
<th>TECHNICAL LAMP REFERENCES</th>
<th>LAMP BASE TYPES</th>
</tr>
</thead>
<tbody>
<tr>
<td>ø15.25 19 19.0 19.05</td>
<td>E11 E12 E17</td>
</tr>
<tr>
<td>ø15       15.25</td>
<td></td>
</tr>
<tr>
<td>ø10.7     10.2 10.5</td>
<td></td>
</tr>
<tr>
<td>ø11.5     11.8</td>
<td></td>
</tr>
<tr>
<td>ø11.8     11.5</td>
<td></td>
</tr>
<tr>
<td>ø17       17</td>
<td></td>
</tr>
<tr>
<td>E26       E39/E40 EP39</td>
<td></td>
</tr>
<tr>
<td>EU11       EX39 Fc2 / Fc2/18 FESTOON G4</td>
<td></td>
</tr>
<tr>
<td>G24q-1 G24q-2 G24q-3 GU4 GU5.3 GX5.3 GU10 GX16d</td>
<td></td>
</tr>
<tr>
<td>GX23 GX23-2 GX24d-2 GX24d-3 GX24q-1 GX24q-2 GX24q-3 GX24q-4</td>
<td></td>
</tr>
<tr>
<td>GY6.35 GZ4 GZ10 Pin Blade R7s-12 RIGID LOOP RX7s/RX7s-24 WEDGE</td>
<td></td>
</tr>
</tbody>
</table>

All dimensions are in millimeters (mm).

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Ushio America has partnered with Veolia to offer RECYCLEPAK lamp and ballast recycling kits through our website at recyclepak.ushio.com.