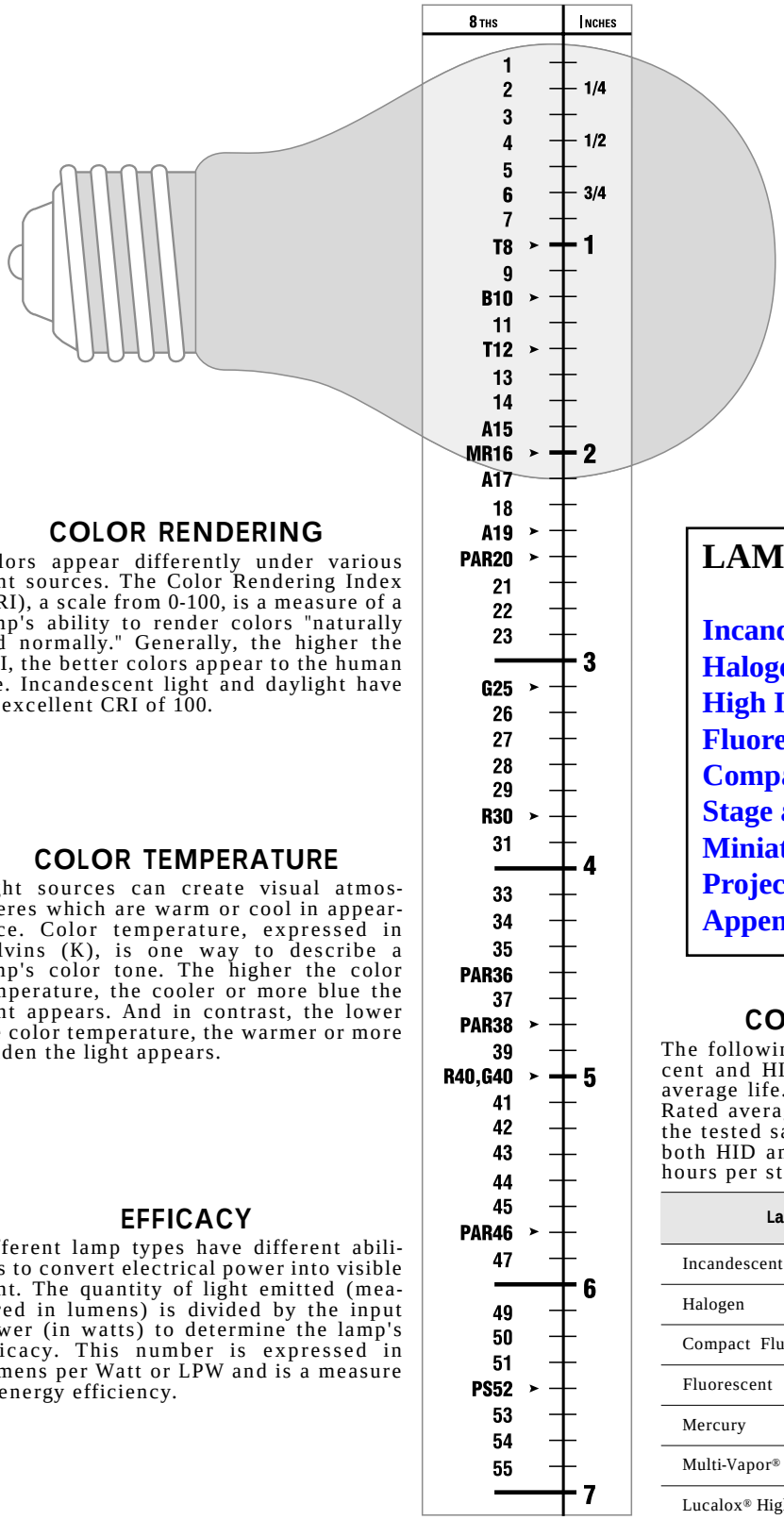
LAMP SIZE AND COMPARISON FEATURES



LAMP SIZE

Lamp size (maximum lamp diameter) is expressed by the letter "A" and then a number representing eighths of an inch (1/8in. = 3.2mm). For example: an "A17" size bulb is 17-eighths of an inch or 2 1/8in. (54mm) in diameter at its maximum dimension.

COLOR RENDERING

Colors appear differently under various light sources. The Color Rendering Index (CRI), a scale from 0-100, is a measure of a lamp's ability to render colors "naturally and normally." Generally, the higher the CRI, the better colors appear to the human eye. Incandescent light and daylight have an excellent CRI of 100.

COLOR TEMPERATURE

Light sources can create visual atmospheres which are warm or cool in appearance. Color temperature, expressed in Kelvins (K), is one way to describe a lamp's color tone. The higher the color temperature, the cooler or more blue the light appears. And in contrast, the lower the color temperature, the warmer or more golden the light appears.

EFFICACY

Different lamp types have different abilities to convert electrical power into visible light. The quantity of light emitted (measured in lumens) is divided by the input power (in watts) to determine the lamp's efficacy. This number is expressed in Lumens per Watt or LPW and is a measure of energy efficiency.

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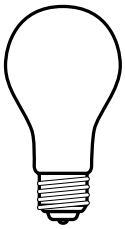
COMPARING EFFICIENCY AND LIFE

The following chart shows how incandescent, halogen, fluorescent and HID lamps compare in terms of efficiency and rated average life. Efficiency is measured in lumens per watt (LPW). Rated average life is the number of burning hours when 50% of the tested samples have failed and 50% are still operational. For both HID and fluorescent, lamp life depends on the number of hours per start.

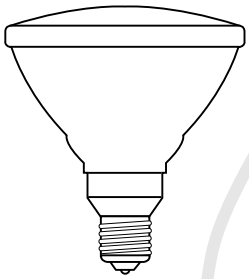
Lamp Type	Typical LPW	Rated Avg. Life (in hours)
Incandescent	5-22	750-2000
Halogen	12-36	2000-5000
Compact Fluorescent	27-80	9,000-10,000
Fluorescent	75-100	12,000-24000+
Mercury	50-60	12,000-24,000+
Multi-Vapor® Metal Halide	80-115	10,000-20,000
Lucalox® High-Pressure Sodium	90-140	10,000-24,000+

VARIETIES OF LAMPS



INCANDESCENT LAMPS

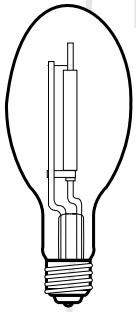
Incandescent lamps are the most familiar type of light source, with countless applications in homes, stores, and other commercial settings. Light is produced by passing electric current through a thin wire filament, usually of tungsten. Their advantages include low initial cost, excellent color qualities, good optical control, and versatility.



HALOGEN LAMPS

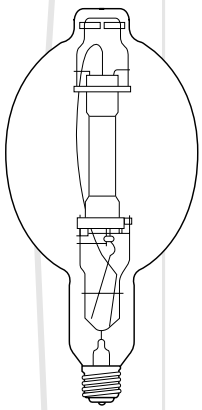
Halogen lamps also produce light by passing current through a thin wire filament, but these filaments operate at higher temperatures, which in turn increases efficacy (LPW) by more than 20%. Color temperature is also higher, producing "whiter" light than standard incandescent lamps. Halogen lamps are available in a variety of shapes and sizes and can be effectively used in a variety of lighting applications, including accent and display lighting, car headlamps, and outdoor floodlighting.

The high-intensity discharge lamp (HID) relies on light emitted by a gas or vapor that has been excited by an electric current. A ballast is needed to start the lamp and regulate its operation. Discharge lamps have overwhelming energy efficiency advantages over incandescent sources where applicable. High-pressure sodium, metal halide, and mercury vapor are all classified as high-intensity discharge lamps.



HIGH-PRESSURE SODIUM LAMPS

High-pressure sodium lamps are highly efficient, (up to 140 lumens per watt), and produce a warm, golden color. Excellent for lighting large areas, they are often used in roadway lighting, floodlighting, offices, shopping malls, reception areas, parks, industrial, and other commercial lighting uses. A deluxe version has improved color rendering for interior and exterior applications.

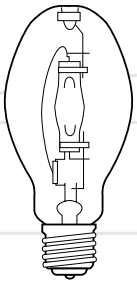


METAL HALIDE LAMPS

High-pressure metal halide lamps are also very efficient (up to 115 lumens per watt), and produce a crisp, white light with good to very good color rendering properties. They provide good optical control and are used in high quality outdoor lighting installations like floodlighting and sports lighting applications, and in retail, lobbies and other commercial and public spaces.

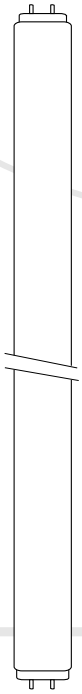
The newest members of the metal halide family are called ceramic metal halide (CMH). These exciting new designs provide halogen-like color appearance, high efficiency and superior color control qualities, expanding the use of metal halide to even more color critical areas in retail, commercial, and even residential applications.

VARIETIES OF LAMPS cont.



MERCURY VAPOR LAMPS

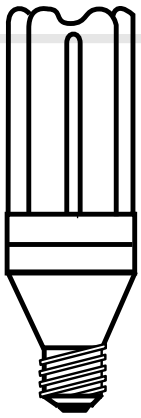
Mercury lamps are the oldest members of the high intensity discharge family. Although not as energy efficient as metal halide and high pressure sodium lamps, they are still used in a variety of applications such as roadway lighting, security and landscape lighting, and some interior applications where color quality is critical.



FLUORESCENT LAMPS

Fluorescent lamps are low-pressure mercury discharge lamps which are very energy efficient (up to 100 lumens per watt). Each requires a ballast to effectively start the lamp and regulate its operation. With fluorescent lamps, the amount and color of light emitted depends on the type of phosphor coating applied to the inside of the lamp.

The wide range of phosphors available makes it possible to produce many different color tones (color temperatures) and different levels of color quality (as defined by the Color Rendering Index) to fit the needs of the specific application. Because of the relatively large surface areas, the light produced by fluorescent lamps is more diffuse and is far less directional than "point sources" like incandescent, halogen, and HID lamps. All of these qualities make fluorescent lamps excellent for general lighting, wall-washing and task lighting in retail, office, industrial, and residential applications.



COMPACT FLUORESCENT LAMPS

The Lighting line of compact fluorescent lamps represents a major breakthrough in fluorescent technology. Because of their smaller diameters and folded configurations, compact fluorescents can provide high light output in much smaller sizes than conventional linear fluorescent lamps. Available in a variety of plug-in (separate ballast required) and built-in ballast designs, compact fluorescent lamps have led to the design of new-generation light fixtures for a complete range of industrial and commercial applications, and provide energy saving and longer life replacements for incandescent lamps. In fact, compact fluorescent lamps can provide the same lumens as an incandescent lamp at nearly one-fourth the cost.