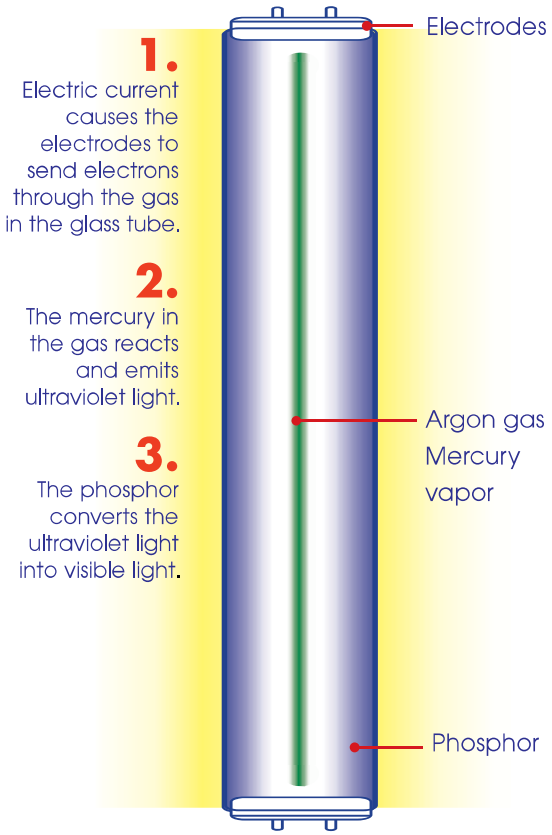
Fluorescent Basics

How it Works

The glass tube of a fluorescent lamp is filled with a gas containing argon and mercury vapor. The interior wall of the tube is coated with a paint known as phosphor. At each end of the tube, electrodes send electrons through the gas causing it to emit ultraviolet light. As the ultraviolet light passes through the phosphor coating, it is converted into a longer frequency to create visible light. The glass tube of the bulb prevents the harmful UV rays from escaping. Fluorescent lamps are more efficient than incandescent lamps because less energy is converted to heat. Instead, most of the energy used creates visible light.



Color Advancements

The phosphor coating on pioneer fluorescent lamps, called "halophosphate," was a single-color band phosphor that produced "cool white" light. This light resembles daylight, but it is weak in the green and red part of the spectrum and stronger on the yellows. This imbalance distorts visual perception of color, but for many years the cool white halophosphate fluorescent was the only choice available.

"Warm white" and "daylight" lamps improved color for fluorescents. These lamps also used halophosphate, but they were designed to achieve certain effects: "warm" to resemble incandescent light, and "daylight" to create an effect similar to natural light. Still, these lamps fell short in their ability to render colors accurately.

Full spectrum, natural and deluxe represent just a few lamp types that improved fluorescent color performance over the years. However, each type usually sacrifices light output.

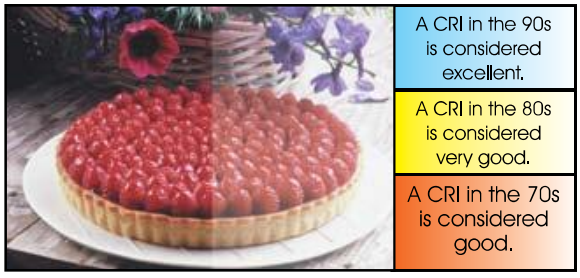
Color Temp	Warm	Neutral	Cool	Daylight
Kelvin Range	3000K	3500K	4100K	5000K
Effect & Mood	Warm & Friendly	Inviting & Comfortable	Clean& Roganized	Bright & Alert
Application	Homes & Restaurants	Showrooms & Reception Offices	Office & Hospitals	Galleries & Jewelry Diplay

Triphosphorous Lamps

Today's fluorescent lamps use a triphosphor coating containing specific color bands of red, green and blue. These lamps render colors much more accurately than their halophosphate counterparts.

The new generation of fluorescent products are rated by CRI (color rendering index) and by color temperature (in Kelvins). CRI rates a fluorescent lamp's ability to render color as accurately as incandescent light or natural daylight, with 100 representing the top of the scale.

Kelvin color temperature refers to the tone of the light. A lamp that produces light for example in the 2700K range is similar in color to an incandescent lamp: warm and inviting. Other color temperatures—3000K, 3500K, 4100K, 5000K and 6500K—are made to work in specific environments for mood and color matching.



Technology to Watch: T5 Lamps

T5 linear lamps are the latest triphosphor lamps to take center stage. Their slim, 5/8-inch diameter and smaller ballasts have given product designers a fresh concept for approaching energy-efficient lighting.

T5 lamps are available in 14, 21, 28 and 35 watts and high-output versions come in 24-, 39-, 54-, and 80-watt models. Standard and high-output T5 lamps maintain more than 95 percent of their light output at 40 percent of their rated life (about 8,000 hours). Their improved phosphor coating reduces the mercury absorption and ensures a long, high-performance life. Compared to T8 lamps, which perform best at 77° F, T5 lamps work best at 95° F. So standard and high-output T5 lamps are well suited for enclosed fixture applications.

This new breed of T5 lamps cannot be interchanged with T8 lamps or operated on a T8 ballast. Many new lighting systems have been designed specifically for the T5, which improves optical control due to the smaller size of the lamp. The T5's high efficacy means that fewer lamps are required and its improved lumen maintenance results in fewer relampings.

At Your Disposal

Although fluorescent lamps contain mercury, the amount in a single bulb is too small to require special handling by federal disposal standards. However, a few states and localities prohibit fluorescent lamps from being thrown out with household trash. Consult your local waste disposal officials for regulations in your area. Or visit www.lamprecycle.org for Web links to individual state rules. Many cities offer recycling facilities for the mercury and glass tubes of fluorescent lamps. Visit www.earth911.org to find your closest lamp recycling facility by zip code.

Special Application Products

Since fluorescent lamps are widely used in commercial applications, there have been many special-use products made.

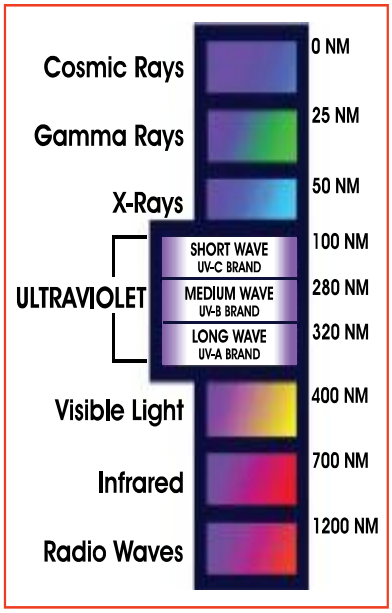
Cold weather lamps are made with heavier glass tubes and are filled with krypton gas. They work best in cold environments.

High Output (HO) and Very High Output (VHO) lamps are designed to be used with ballasts that supply a higher current arc within the tube.

The lamp and ballast combinations are usually just as efficient as standard fluorescent lamps.

However, since they produce a higher lumen output, fewer lamps are needed. Typical uses are sign and display applications. Extra care is required in certain uses because these lamps emit higher amounts of UV than standard fluorescent lamps.

Fluorescent lamps, by the nature of their design, can be modified to perform at different wavelengths. These wavelengths, rated in nanometers, can be created/modified by a particular phosphor mix or no phosphors at all. Germicidal lamps, for example, use no phosphor and operate in the 253.7 nanometer range, emitting shortwave UV rays to kill germs in water filtration systems, air cleaners, etc.



Suntan fluorescent lamps are another UV light source, functioning in the 315 to 345 nanometer range. These lamps should be handled with care and used only as instructed. UV rays are harmful to the eyes and skin.

A few other types of special purpose lamps are black lights, plant lights and lamps for photocopiers. Each operates at a designated wavelength and may use a specific phosphor mix.