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Fluorescent Lighting Basics

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Light from a fluorescent lamp is first created by an electric current conducted through an inert gas producing ultraviolet light that is invisible to the human eye. The ultraviolet light in turn interacts with special blends of phosphors coating the interior surface of the fluorescent lamp tube that efficiently converts the invisible light into useful white light. Fluorescent lamps require a special power supply called a ballast that is needed to regulate lamp operating current and provide a compatible start-up voltage. Electronic ballasts perform the same function as a magnetic ballast but outperform the outdated magnetic products by operating at a very high frequency that eliminates flicker and noise while simultaneously increasing efficiency. Electronic ballasts are also more easily designed to allow for more consistent and efficient lamp operation, lamp dimming, and networking of lighting products for advanced control of lighting.

The two general types of fluorescent lamps are:

- **Compact fluorescent lamps**
- **Linear fluorescent lamps and Circline™ lamps**

COMPACT FLUORESCENT LAMPS

Compact fluorescent lamps (CFLs) work exactly like linear fluorescent lamps (LFLs) only on a smaller scale. They consist of two parts: a gas-filled tube and a power supply called a ballast that is either magnetic or electronic. The gas in the tube glows with ultraviolet light when electricity from the ballast flows through it. This, in turn, excites a specially engineered phosphor coating on the inside of the tube, which emits white, visible light throughout the surface of the tube.

Many fluorescent lamps with magnetic ballasts flicker slightly when they start especially when cold. Because of the magnetic components, they are also heavier than those with electronic ballasts. This may make them too heavy for

some light fixtures. Electronic ballasts are sometimes expensive depending on their exact specifications but generally turn on more quickly and reliably especially at very low temperatures. They are also more efficient than magnetic ballasts and produce much less electromagnetic interference. Most CFL lamps will last about 10,000 hours and the ballast about 50,000 hours or more. Most currently available CFLs have electronic ballasts integrated into their bases that are used in residential applications. Most CFLs used in commercial applications have their electronic ballast permanently located in the fixture so only the lamp requires replacement.

CFLs are designed to operate within a specific temperature range. Temperatures below the range cause reduced luminous output. Most CFLs are designed for indoor use, but there are models available for outdoor operation. A CFL's temperature range is usually listed on its package.

TYPES OF COMPACT FLUORESCENT LAMPS

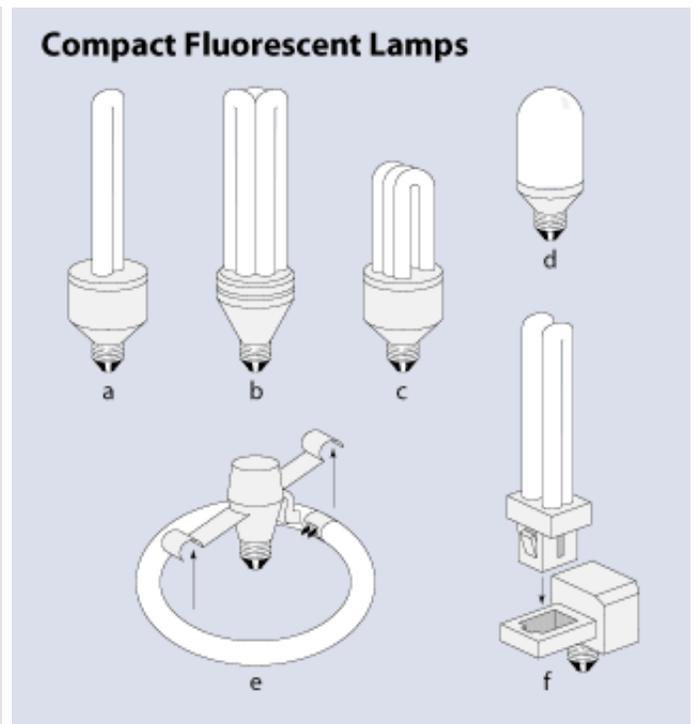
CFLs may have two, four, or six tubes or circular or spiral-shaped tubes. The size or total surface area of the tube(s) determines how much light is produced.

In some CFLs, the tubes and ballast are permanently connected. These are commonly called integral CFLs. Other CFLs have separate lamp tubes and ballasts. This allows the tubes to be changed without changing the ballast and is generally used in commercial environments where the lamp will be illuminated for long periods. There are also examples of both types whose tubes are enclosed in a glass globe. These look somewhat similar to conventional incandescent light bulbs, except they are often larger in diameter and length.

Most Integral CFLs fit into light fixtures or luminaires originally designed for incandescent lamps that use common Edison Bases such as "medium" E-26 or "candelabra" E-12. Although most CFLs fit into existing three-way E-26 lamp sockets, only some CFL lamps can be dimmed. This feature will be listed clearly on the lamp package. Learn more about the types of CFLs and their uses in homes on [Energy Saver](#).

LINEAR FLUORESCENT AND CIRCLINE LAMPS

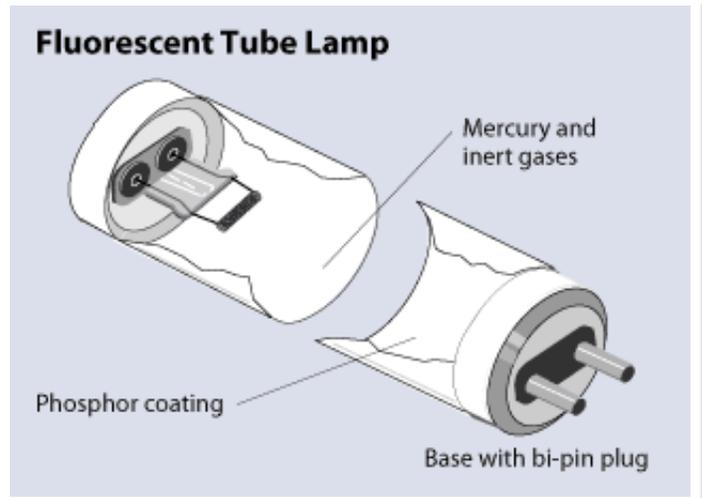
Fluorescent tube lamps are usually identified as T12, T8, or T5 (with the suffix digit designating the diameter of the lamp tube (in inches) divided by 0.125 or one-eighth of an inch). They must be used in a dedicated fixture or luminaire that is supplied with a suitable ballast. Examples of these lamps may be straight, bent (U-tube) or circular (e.g., Circline™) in shape. By far, the most common LFL is the 40-watt, 4-



CFLs come in a variety of sizes and shapes, including (a) two in-tube integral, (b and c) triple-tube integral, (d) integral model with casing that reduces glare, (e) modular circline and ballast, and (f) modular quad-tube and ballast varieties.

foot (1.2-meter) lamp followed by the popular 75-watt, 8-foot (2.4-meter) lamps found in most commercial and industrial buildings.

Visit [Energy Saver](#) for more information on using fluorescent lighting in your home.



In fluorescent tubes, a very small amount of mercury mixes with inert gases to conduct electrical current. This allows the phosphor coating on the glass tube to emit white, visible light.

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