

LED lighting offers several advantages over traditional fluorescent lighting - including higher efficiency, lifetimes of up to three times longer, better control, resistance to breakage, and mercury-free disposal.

### Tubular LED Lamp Options

Tubular LED lamps, also known as TLEDs, can reduce your energy and maintenance costs and improve your bottom line while providing quality light output and long lifetimes. TLEDs can be the lowest cost option to get benefits of LED lighting because they are designed to be installed in your existing fluorescent fixtures.



#### Type A Plug & Play

Linear LED lamp designed to work with compatible fluorescent ballasts.

**Pros:**  
Simple installation.

**Cons:**  
Reduced efficiency. LED lamp must be compatible with fluorescent ballast.

#### Type B Ballast-Bypass/ Direct-Wire/ Line Voltage

Linear LED lamp with integral driver. Lamp sockets are directly wired to line voltage.

**Pros:**  
No compatibility issues with fluorescent ballasts.

**Cons:**  
Rewiring required. Also requires non-shunted lamp holders.

#### Type C External Driver

Linear LED lamp designed to work with an external/ remote driver.

**Pros:**  
Can be integrated with dimming and control functionality.

**Cons:**  
Rewiring required.

#### Hybrid/Dual Technology

Linear LED lamp that works with compatible fluorescent ballasts (like Type A) or directly wired to line voltage (like Type B).

**Pros:**  
Takes advantage of the easy installation of Type A and the increased maintenance savings of Type B.

**Cons:**  
Eventual rewiring and non-shunted lamp holders required.

There are special considerations when retrofitting fluorescent fixtures to operate TLED lamps. Each TLED product and application will have its own set of unique requirements, so care must be exercised to closely follow the lamp manufacturer's instructions. Since installing some TLED products requires rewiring fixtures, anyone interested in installing these products should obtain the services of a qualified electrician.

# LED Fixture Options

LED retrofit kits and fixture replacements often provide better light distribution than tubular LED replacement lamps because they are able to better integrate the LED source with the structure of the troffer and optical elements.

**Retrofit Kits** - LED retrofit kits are designed to replace fluorescent lamps, sockets, and ballasts within existing troffers, and require some form of electrical rewiring. Typically these prepackaged kits are used in direct fixtures when you want to keep the existing luminaire housing.

**Fixtures/Luminaires** - LED fixtures are designed to replace or be installed instead of fluorescent troffers. While typically higher in cost, this option often provides the LED technology in a well-designed package with a straightforward electrical installation.

## Additional Considerations

Consider the **brightness level** of your space, as different uses require different levels. Brightness is measured in lumens, and higher lumens indicate more light.

**Light appearance**, which refers to the color of light produced, is measured in Kelvin. As seen in the Kelvin Temperature graphic, **WARMER** colors are associated with **LOWER** Kelvin, and vice versa.



## Utility Rebates

LED lighting can provide outstanding energy efficiency. However, LED lamps and fixtures are not all the same when it comes to performance. We provide higher rebates for LED bulbs and fixtures that meet the performance, quality, and reliability requirements of the DesignLights Consortium® or ENERGY STAR®. Visit [www.SaveEnergyInRedwoodFalls.com](http://www.SaveEnergyInRedwoodFalls.com) for rebate information.

### DesignLights Consortium® (DLC)

[www.designlights.org](http://www.designlights.org)

The DLC promotes quality, high-performance, and energy-efficient LED lighting products for the commercial sector. Products must meet certain technical requirements to qualify. The DLC qualifies commercial LED luminaires, retrofit kits, and linear replacement lamps for inclusion in utility rebate and incentive programs.



### ENERGY STAR®

[www.energystar.gov](http://www.energystar.gov)

LED bulbs and fixtures that have earned the ENERGY STAR meet energy efficiency and performance guidelines set by the U.S. Department of Energy and the U.S. Environmental Protection Agency. ENERGY STAR means high quality and performance, particularly in the areas of color quality, light output, light distribution, and lifetime. ENERGY STAR rates LED bulbs and fixtures that are mainly for residential applications, though they can also be installed in commercial facilities.

