

WHITE PAPER SERIES

4

# Illuminating the Facts on LED

DESIGN FUNDAMENTALS: FF&E SPECIFICATIONS



# Illuminating the Facts on LED

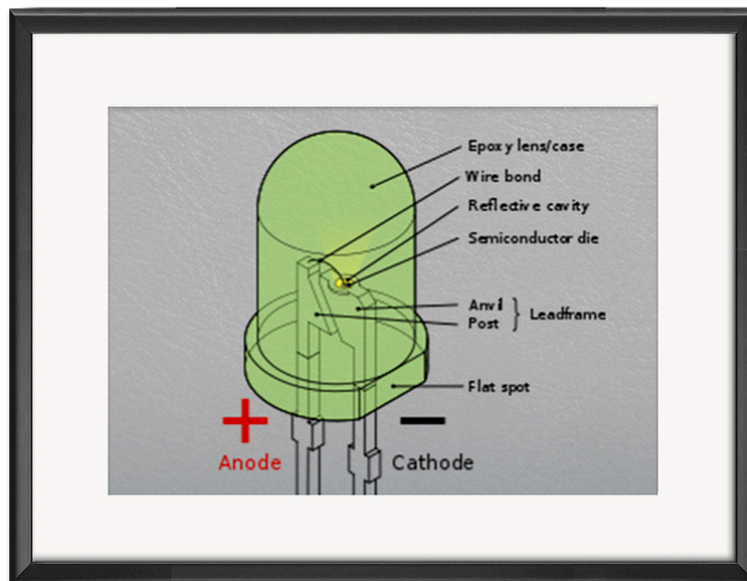
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(To begin with), what is LED?

LED stands for Light Emitting Diode. A Diode is a semiconductor device with two terminals, typically allowing the flow of electric current in one direction only (positive to negative). When the proper amount of electricity is put through the diode light is emitted / produced from the diode.

To put it simply, it's a very small light-bulb that lasts a really long time!

The diagram below shows the basic make up a single LED.

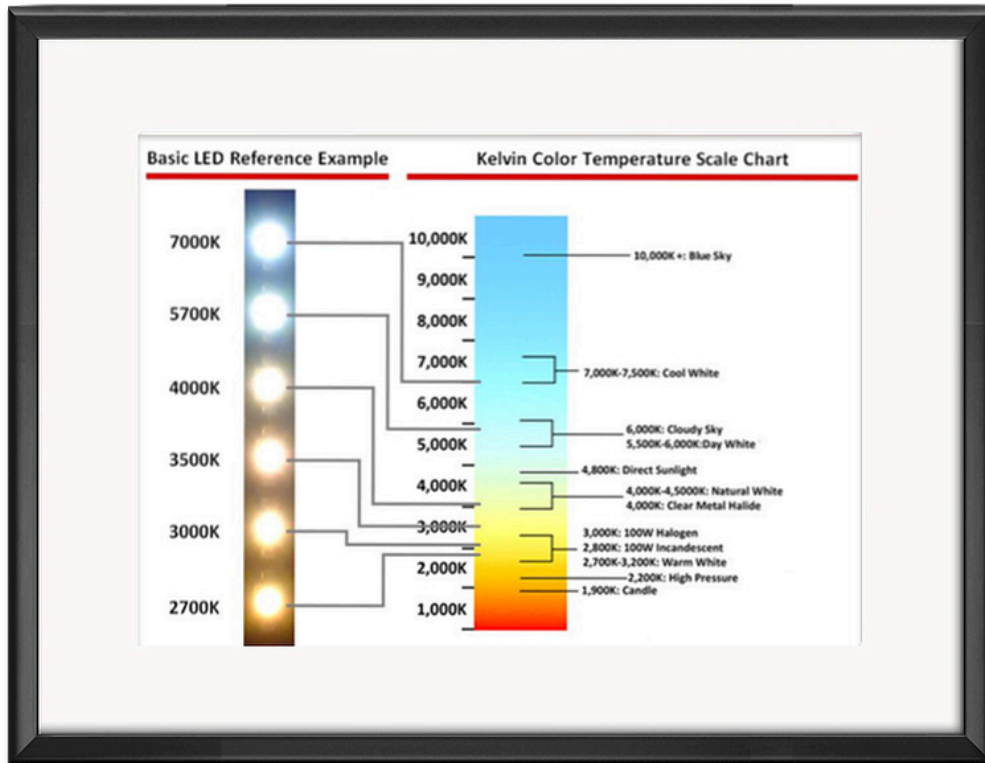


The principle is the same whether working with a single diode or a string of diodes, such as LED strip or tape lighting. When working with furniture the most common type of LED lighting used is strip / tape lighting due to its compact size and ability to be somewhat pliable. This allows the LED to follow the curves of furniture and for installation in “hidden” areas such as small channels routed into the underside of shelves or recessed areas behind headboards to give an ambient glow into the room.

Now Let's go deeper into the world of LED and how it directly affects YOU and your design project.

LED LIGHT (as well as all light) has a specific color...

Some are reddish in color, some bluish in color and everything in-between. These "colors" are measured by something called the Kelvin Scale.



The Kelvin Scale was created in the late 1800's by Lord Kelvin, who used this unit of measurement to create a temperature range from "absolute zero" and up. Absolute zero is where all molecular movement ceases. Whoa that's cold! He did a lot of really cool things with this in the world of science but here is what directly relates to you and color temperature.

He heated a solid block of carbon and recorded the color of that block as its temperature rose. The block at first glowed with a warm red and as its temperature rose became a brighter yellow and then on to a whitish-blue. These colors became what we know as the Kelvin Scale when speaking about color temperature. Pretty cool stuff! Lower color tones such as commonly used 2700 kelvin lighting will find itself on the reddish / yellow side of the scale while higher color tones such as 4000 - 5000 kelvin will rest at the bluish / white side of the scale. This is better explained by the chart above.

Take note that most lighting will fall between the 2200k and 5000k area of the scale. Above and below those temperatures produce light that is either harsh on the eyes or too dim to be considered for use in most applications.

## LET'S TAKE A LOOK AT POWER!

Most LED products run on low voltage such as a 12 volt or 24 volt system, in comparison to your home, which in the USA is typically 120 volts. Most individual LEDs draw / require only a fraction of a watt of electricity to operate, whereas most incandescent bulbs, like the ones found in your home, typically draw anywhere from 45 - 90 watts of electricity. This makes LED extremely efficient when compared to the typical household bulb.

In order to convert the 120 volts coming out of most household outlets to 12 to 24 volts we must use a transformer. These transformers do just what they sound like they do, they "transform" or convert the 120 volts down to the usable 12 to 24 volts for the LED to operate properly and safely.

This is where it becomes extremely important to understand the application of your LED project and the importance of safety.

While LED has a great reputation of having little to no heat buildup, there are some things to consider when incorporating LED into furniture or any other object.

When you have a single diode on a light-up keychain, that diode will produce almost no recognizable heat. When you have a number of diodes running in succession, such as on strip or tape lighting, there will be a considerable amount of heat buildup.

This especially applies to the transformer, which is working hard to convert power and supply what could be 100s of diodes at the same time. This is where properly rated equipment comes in. There is where properly rated equipment comes in. There are a number of companies registered here in the U/S/ that provide testing and certification of these electrical systems, the largest and most recognized being UL (Underwriters Laboratories). In fact, if you were to flip over most major electrical items in your home or office you will probably see UL's "stamp of approval". These companies rigorously test electrical components for their intended use and guarantee that they are operating within safe parameters.



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When incorporating LED into furniture this becomes of the utmost importance. Many LED systems carry UL certification, but it is important that the rating be specific for use in the furniture. Why is this important? It's important because most furniture as we know it is made from wood. Wood is an extremely flammable material, and stuffing electrical items into this wood needs to be done in a safe manor! You wouldn't want your brand-new headboard to catch on fire while you're sleeping would you?! Therefore, before putting just any LED system into a piece of furniture, make sure it is specifically rated for use in furniture.

A responsible, experienced furniture manufacturer will offer guidance in appropriate UL rated LED technology. Ask for the UL number that is associated with the LED system your manufacturer is using. Google it to make sure it's for use in furniture! Now that you have LED in your furniture it must be installed into the room. As with most hotel guest rooms now, the furniture is being designed to look built-in, or designed on a large scale giving the room a grand experience. The days of simple, stand-alone furniture in hotel rooms are few and far between.



The Novotel Times Square, N.Y.  
Custom Headboard with LED lit Acrylic Pannel  
Designed by Stonehill & Taylor  
Purchased by Martin Stringfellow Associates



Newport R.I. Marriott. LED lit cabinetry with illuminated sail cloth running the full width of the room.  
Designed by EOA.  
Purchased by Martin Stringfellow Associates.

With these grand design schemes comes installation. Installation of this furniture can be something as simple as a few wall cleats, to the now much more common, involved process of assembling furniture onsite to become full wall structures, desks that incorporate TV panels which waterfall into luggage benches and the link. When these pieces utilize LED lighting in their design, that light is often spread throughout the piece of furniture not localized to one area. This inevitable will involve connecting the lighting from one area or section on the furniture to another areas or section on that same piece of furniture. For instance, if you have a large headboard wall that is built into tow or three pieces in order to fit the item through the hotel and into the room, you will have to connect the two or three pieces together.

This is where a “plug and play” type set up will be of great time savings to you and your installation crew. “Plug and play” is the ability to plug your components such as LED strip / take lighting and your transformer together without the need to cut, splice and / or solder your components or wiring together. Essentially it is a male or female plug set that is pre-UL rated and meant to work with your electrical components. This drastically cuts down on installation time as well as making it quite easy to decipher which wire goes where. This is something to

take into consideration when working with LED product as it is not only the up-front cost of the furniture / LED to consider, but the time and man hours needed to install that furniture / LED.

Now that you have a basic understanding of how these systems work, and how to keep yourself and others safe, let's talk Lingo... you know, you have to be able to talk the talk! Below are some commonly used terms when speaking about LED:

L.E.D. \el-ee-dee\ n.

Light Emitting Diode

Switch \swich\ n.

Device that allows control over the power source (transformer) for the LED allowing the user to turn the item on and off.

3-way switch \three-wey\ \swich\ n.

Two separate switches that control a single transformer / driver, giving you the ability to turn the transformer / driver on / off from two different locations.

Transformer \trans-fawr-mer\ n.

An electrical device that transfers electrical energy between two or more circuits. They are used to increase or decreased voltage between a power source and the object receiving that power.

Lumen \loo-muh n\ n. plural

A unit of measure used to determine the amount of usable light emitted from a source.

L.E.D. Leed \el-ee-dee\ \leed\ n.

An interconnecting wire that joins the transformer / driver to the LED.

2-way switch \too-wey\ \swich\ n.

A single switch that allows on / off operation.

Daisy Chain \dey-zee\ \cheyn\ n.

Allows for the connection of one LED group / strip to another so only one power source is needed. Think of this like a bridge for power.

Driver \drahy-ver\ n.

Generally a small, self-contained power supply that regulates the power required for an LED or an array of LEDs to operate.