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DEVELOPMENT COMPANY

Manufacturers of Ceramic Capacitors, Varistors and SPDs
Established 1947

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LED Lighting Protection
Recommended Products & Practices

This white paper is designed to offer recommended Maida products, along with practices, for the protection of LED lighting products.

LED lighting products have become the staple of the lighting industry. There are many reasons for this shift (removal of incandescent bulbs through Presidential mandates and laws, lack of consumer interest in fluorescents, etc.), the lighting industry has embraced the LED. LED efficiency, long life, now lower cost, ease of disposal, and more "natural" colors allow for use in residential, commercial, and industrial applications. Some of the most common uses are:

- Standard A19 size bulb
- 4' and 8' light fixture
- Street lighting

The design of LED lighting typically requires the use of a driver circuit. The driver circuit steps down and converts incoming AC to DC as LEDs require low voltage DC to operate. These driver circuits are (arguably) more susceptible to transients.

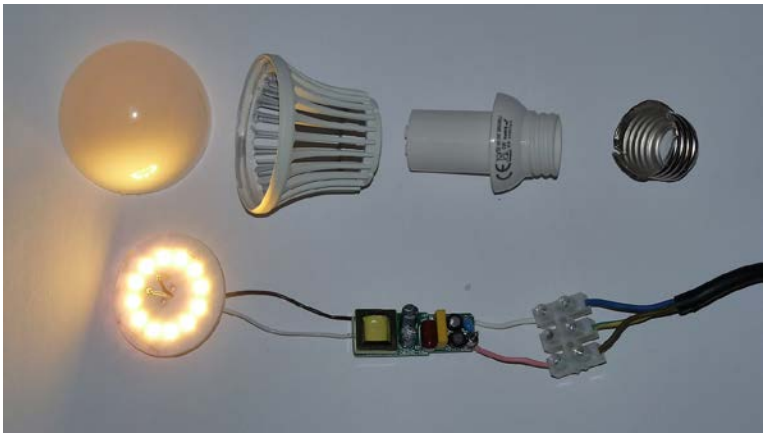

Image 1 [(4)]: Example of bulb type LED

As seen in Image 1, the driver circuit is located within the base of the A19 bulb. To protect this type of product Maida recommends the following products:

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- Standard Series varistors (Standard Series)
  - 5mm
  - 7mm

Larger diameter MOVs can certainly be used, however in most cases the fixtures' physical dimensions will not permit larger devices. Also, transients experienced at the locations used by these types of LEDs are not as severe and smaller diameter MOVs can be used.

The 4' and 8' LED light fixtures are used in residential, commercial, and industrial applications. They are most commonly used in commercial and industrial applications for whole building, office, and parking garages. The products use a much larger driver to power the LED array and are offered in a variety of operating voltages such as: 120VAC, 240VAC, 277VAC, and 480VAC. Many are constructed as universal voltages allowing operation from 95V-277VAC. As a result, better protection is needed to prevent premature failure.

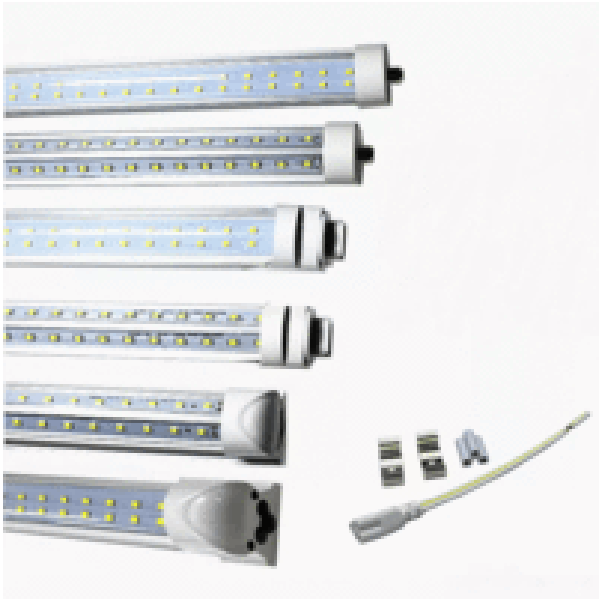

Image 2 [5]: Example of 4' and 8' LED

As seen in Image 2, there are numerous types, and designs, of 4' and 8' LED light fixtures. For these products Maida recommends the following products:

- Standard Series (Standard Series)
  - 14mm
  - 20mm
  - 25mm

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- HC Series (HC Series)
  - 12mm
  - 14mm
  - 16mm
  - 20mm
- MPD Series (MPD Series)
- MPDS Series (MPDS Series)

The larger package of the 4’ and 8’ fixtures allow for much larger MOVs to be used. The MOVs should be installed within the driver, however many lighting fixtures use outsourced drivers and have no control over their design. For products whose drivers do not have integral MOV protection, the use of the MPD or MPDS Series is recommended.

There are numerous designs for LED street lights. Some designs use thin, streamlined enclosures, while others mimic the “cobra-head” design which historically used high pressure sodium lights. These also may, or may not, utilize photo-controls for their on-off function. As in all LED lighting, the street lights use a driver and LED array. As with the 4’/8’ fixtures, the drivers used to power the LED may, or may not, use MOVs for their input protection. As LED street lights are much more susceptible to transients due to their locations, surge protection is essential for their operation.

Image 3 [6]: Example LED street light

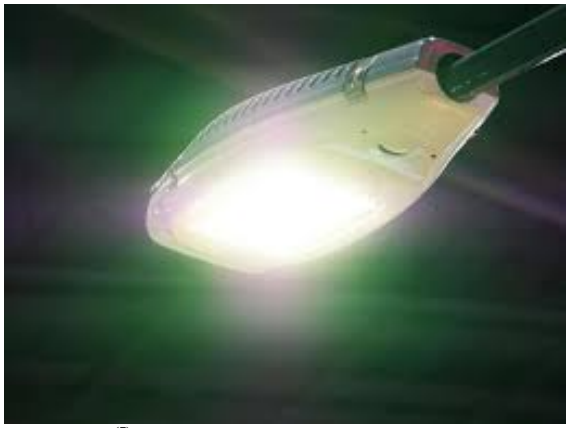
Image 4 [7]: Example LED street light

Images 3 & 4 show examples of these LED designs. For these applications Maida recommends the following products:

- MPD Series (MPD Series)
- MPDS Series (MPDS Series)

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The MPD and MPDS Series are IP65 rated, enclosed SPDs which can be installed within the fixture itself, or installed within the pole that the LED is connected to. Both designs are offered in series and parallel configurations so that the user can decide on the best connection method for their application.

In summary, the end user must decide the most important characteristics of surge protection for their LED lighting application. Maida Engineers have significant experience assisting in the selection and application of LED lighting surge protection. For any questions or concerns regarding solutions for LED lighting protection, please feel to contact Maida.

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Definitions:
Transient: An electrical surge within power lines and cables commonly created by: lightning – conducted or induced, by the switching of inductive loads (transformers, relays, or coils), by Electromagnetic Pulses (EMP), and ESD.
Metal Oxide Varistor (MOV): Typically, a zinc oxide ceramic based electronic component which has a non-linear voltage-current characteristic. A MOV is used in applications which require protection against transients.
Light Emitting Diode (LED): A semiconductor diode (component) which produces light when a specific voltage is applied.
Surge Protective Device (SPD): A device used for the protection against transients. Typically, an enclosed device utilizing flying-leads.

References:

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