

Understanding Luminaires and Lamps

by *Mark C. Ode*

A luminaire is defined in Article 100 as “a complete lighting unit consisting of a lamp or lamps together with the parts designed to distribute the light, to position and protect the lamps and ballast (where applicable), and to connect the lamps to the power supply.”

Since luminaires (lighting fixtures) were not previously defined before the 2002 NEC, this new definition is meant to cover all aspects of a lighting unit, including the lamps that actually provide the illumination, as well as internal and external parts necessary for the proper operation of the unit.

Luminaires can be of the traditional type, such as a recessed or surface-mounted incandescent, fluorescent or other electric-discharge luminaires. Luminaires can also be of the non-traditional type, such as fiber optics with the light source at one location and the fiber core or “light pipe” at another.

In this case, the fiber cable is providing the light distribution for the lighting system. There are also a number of products coming into the marketplace that employ light-emitting diodes (LEDs) as the light source.

Let's focus on a part of a luminaire that is not often discussed and may not be totally understood by many installers and users. Lamps are an important part of the overall lighting system, so a better understanding of lamps, their differences and their location within the luminaire is often critical from both a safety and a functional point of view.

Incandescent lamps are characterized in a number of different ways. The shape of the glass bulb, the finish on the inside or the outside of the bulb, the style of the base, the type and material of the filament, where the lamp is designed to operate and the classification of the lamp are all different ways of classifying a lamp.

Lamps are available in many different sizes, shapes and designs. An incandescent lamp is composed of an electrically conductive base connected through a glass stem to a filament located inside a transparent or translucent glass bulb. Power from the electrical circuit is applied to the center of the electrically conductive base and thus to one side of the filament.

The center of the base of the lamp is insulated from the outer screw portion of the metal base. The outer conductive screw base is connected to other side of the filament and to the neutral of the circuit. When power is applied with an appropriate connection to neutral, electrical current flows through the lamp filament creating heat and light.

While lamps are the technical term for this conventional light source, the term “bulb” is used at times as slang. Bulb actually indicates the shape of the glass of the lamp. For example, a standard-line shape is designated as an “A” (for “arbitrary”) lamp and has a glass bulb that is standard in shape. The “A” lamp is used for general service lamps up to 100W in size.

A lamp that is 150W and larger has a bulb that is pear-shaped with a designating letter of “P” or “PS” for pear shape. The lamp has a higher wattage and develops more heat so the filament is moved further from the base of the lamp. A “C” lamp is cone shaped like a night light lamp. An “F” lamp is flame shaped, such as the type used in a chandelier.

A “G” lamp is a globular shape like the lamps used for a make-up light in a bathroom. A “PAR” lamp has a parabolic shape and is often used as an outside spot for security lighting.

A lamp with an “R” designation is a lamp with a reflector or silver coating on the bulb to reflect the light within the bulb either up or down. A luminaire is often designed with a specific trim or outer portion of the assembly that will help direct heat away from the interior of the unit. Where heat is particularly critical, an “R” lamp may also be used.

The silver coating may be located on the bottom of the bulb around the base reflecting the heat back away from the base or it may be located on the bowl of the bulb reflecting the heat back into the fixture.

The wattage and the design of the lamp, as well as the location within the luminaire, are critical to the proper and safe operation. Installing a lamp within a luminaire where the heat from the lamp may cause deterioration of the wiring and other components within the unit may cause malfunction of the luminaire and possibly a fire.

Always check with the manufacturer’s instruction sheet or the luminaire lamp replacement marking for the proper size, shape, maximum wattage and classification of lamp to be used in a luminaire.

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