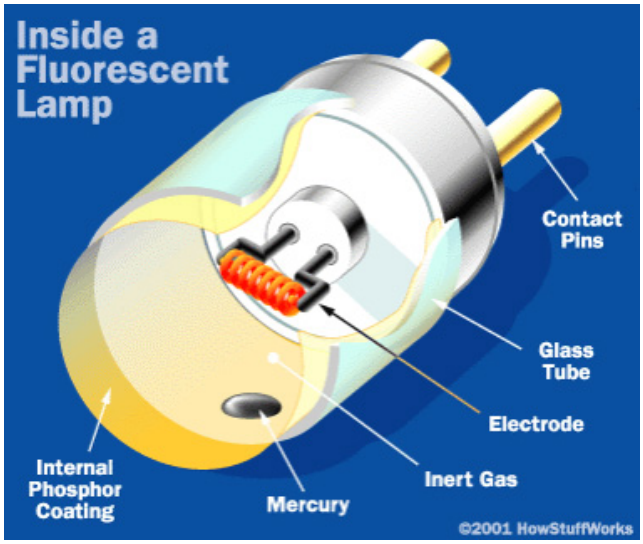
e3 Light

UNDERSTANDING
FLUORESCENT BULBS



Operation

When started, the electrodes at each end of the lamp emit electrons. The electrons travel through the tube in the form of an electrical current. The electrons collide with the mercury atoms contained in the glass bulb. After the collision, the mercury atom releases invisible ultraviolet energy. The ultraviolet energy strikes the phosphor coating and the phosphor converts the ultraviolet to visible light.

Ballast

All fluorescent lamps need a ballast to operate properly. The ballast provides the proper starting voltage and limits the current through the lamp. It is important to have the correct ballast for proper operation. The ballast label has important information such as which lamps the ballast will operate and a wiring diagram.

Bulb Wall

A glass tube or bulb coated with phosphors.

Gas Fill

Usually an electrically conductive mixture of neon and argon gas is used. Krypton/Argon blend is used in Econ-o-watt™ lamps.

Mercury

All fluorescent lamps contain a small amount of liquid mercury, which vaporizes during lamp operation. Philips ALTO® lamps contain less mercury than standard lamps.

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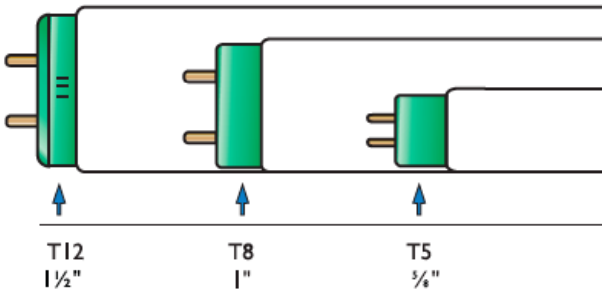

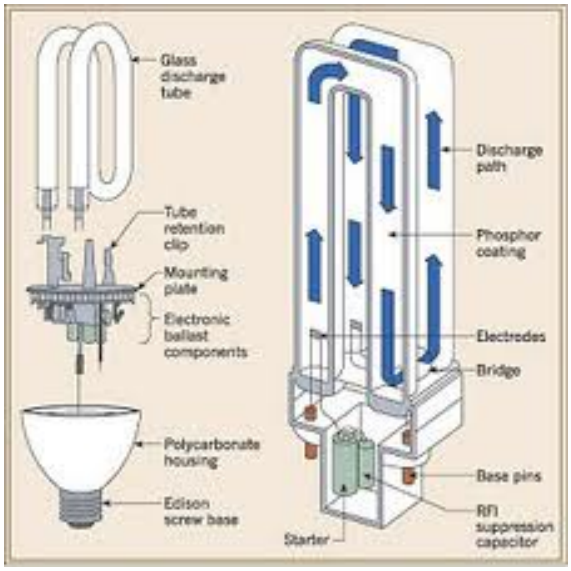

Base

The base is cemented to each end of the lamp to connect the bulb to the electrical circuit.

Electrode

The electrodes are a coiled tungsten wire that conducts electricity to the gas fill. The electrodes are sputtered away as the lamp starts and, are vaporized as it operates. When the electrodes are used up, the lamp can no longer start. Philips bulbs contain an exclusive electrode guard that minimizes end blackening.

Phosphor Coating

Phosphor coating on the bulb wall converts the ultraviolet energy to visible light, in a process called fluorescence. Newer, more expensive phosphor coatings are used on bulbs to provide high color rendering, higher lumen maintenance, and higher light output.

The mood of the light	General purpose light for the home. Ideal for the garage, workshop, or basement.	Comfortable, pleasant light that shows color accurately. Ideal for the kitchen, bathroom, or any room
Color Scale: = Soft light 6500= Vibrant, white light (a)	4100K	3000K
On a scale of 0 to 100, the lamp's ability to show colors accurately (b)	70	85
Also known as…	Cool, Cool White	Warm Deluxe, Kitchen & Bath, Warm White

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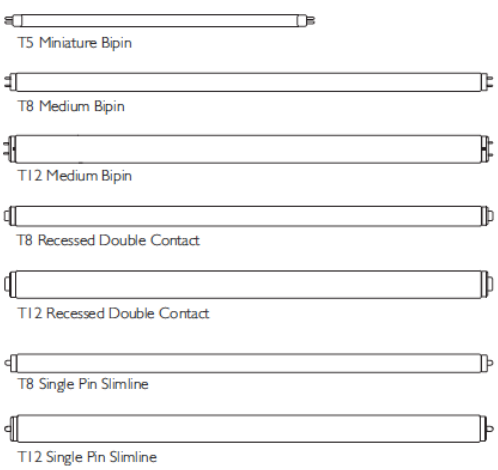
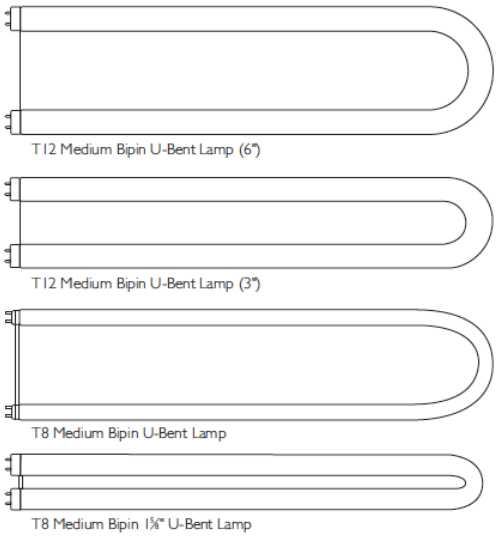
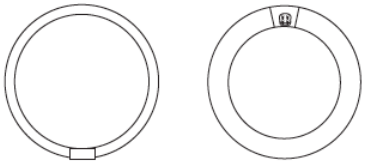
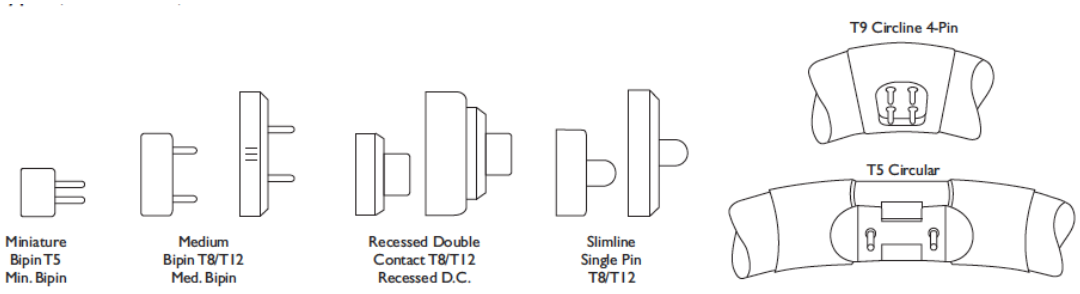
POSSIBLE TUBE BULB SHAPES







POSSIBLE TUBE BASE SHAPES



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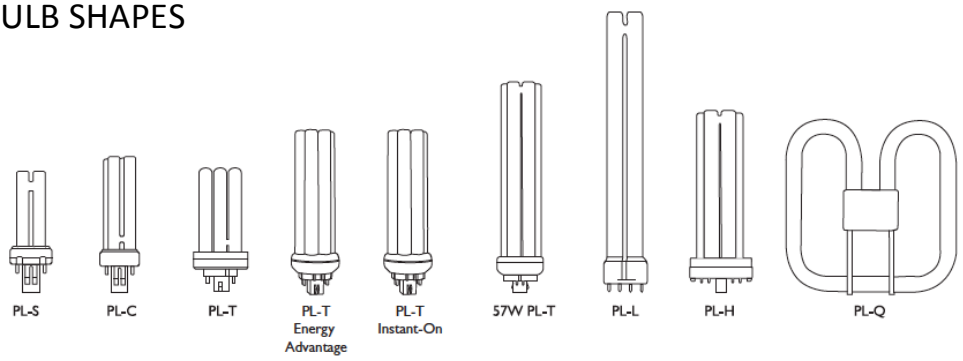
POSSIBLE PL BULB TYPES

POSSIBLE PL BULB SHAPES



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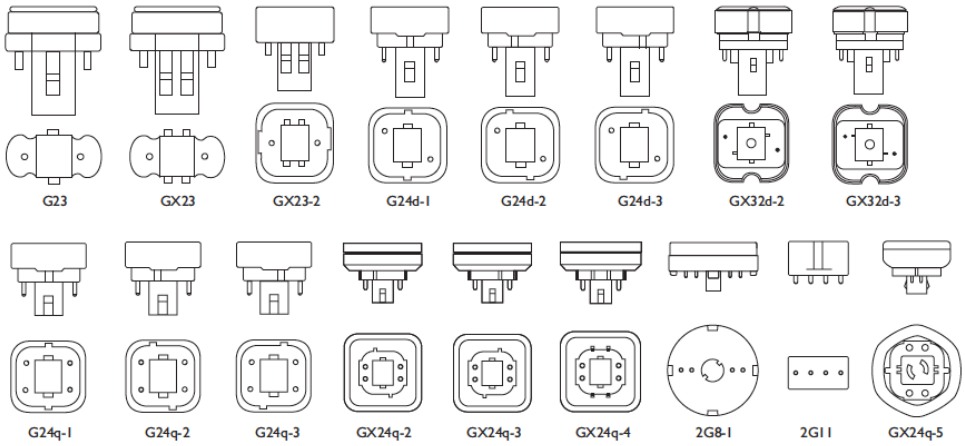

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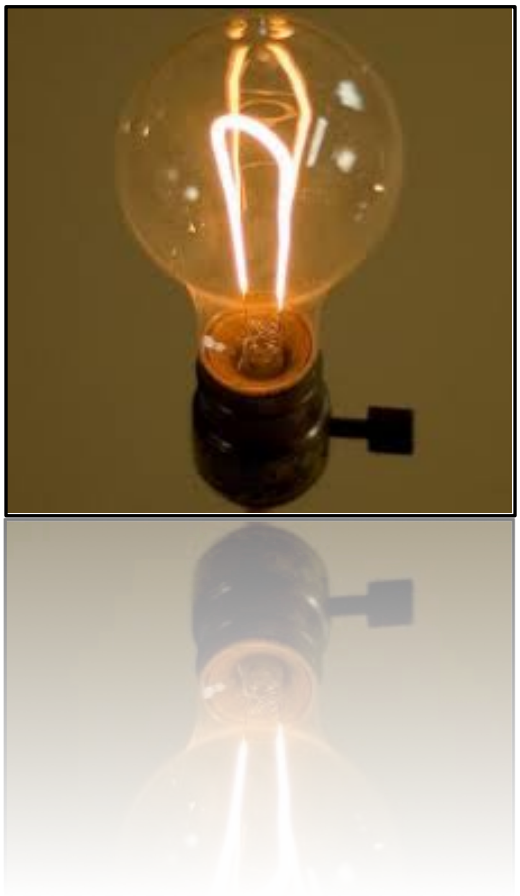
UNDERSTANDING

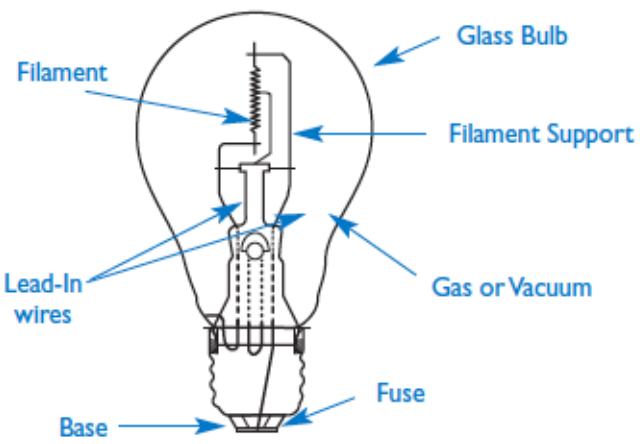
INCANDESCENT BULBS

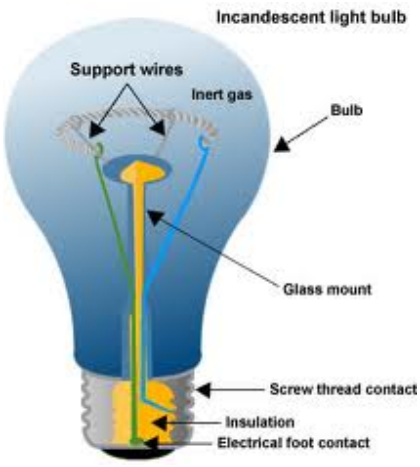


In an incandescent bulb, a tungsten filament is heated by an electric current until the filament becomes incandescent or gives off light. The intense heat causes the tungsten filament to slowly evaporate. This filament evaporation causes two things to happen. First, it causes the bulb to get blackened over time. The blackening of the bulb causes the bulb to become slightly dimmer over time. Second, the filament evaporates, it gets thinner and thinner until it finally gets so thin, it breaks and the bulb fails. This is the normal end of life for an incandescent bulb.

The life of the bulb depends on the thickness of the filament. A thick filament will last longer than a thin one. However, a thick filament does not get as hot so it produces less light. That's the tradeoff – if you want more life, you will get less light and vice versa.

A standard bulb's life is 750-1000 hours and longer life energy saver model bulbs last 1000 to 1500 hours.





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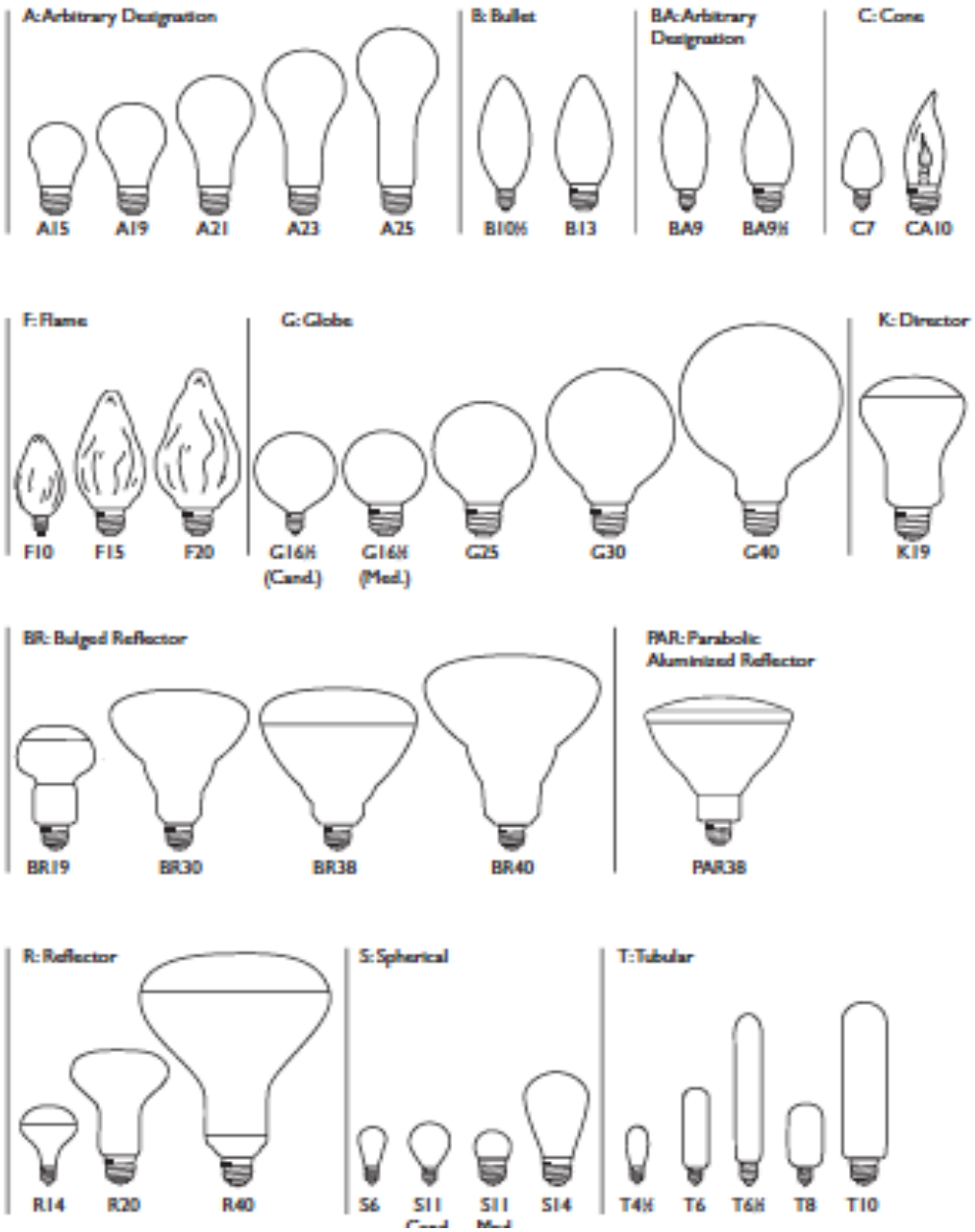
POSSIBLE BULB SHAPES



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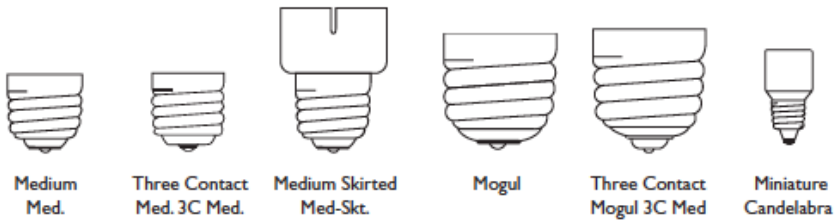
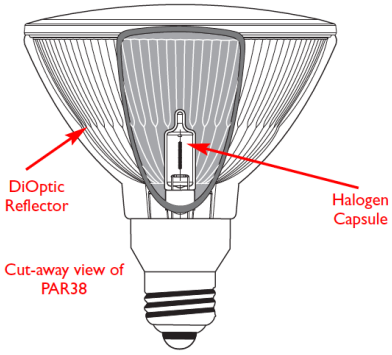


e³ Light

UNDERSTANDING
HALOGEN BULBS

Halogen bulbs are technically incandescent bulbs, however they have three features that make them superior to standard incandescent. They are brighter, whiter, and last longer. A Halogen lamp has a thin filament, which produces more light than its thicker counterpart. This makes Halogen whiter and brighter. You might ask, how does it last longer with a thinner filament? The answer is…… The Halogen Cycle. The filament is in a glass capsule. The glass capsule is an incandescent bulb, however but before the tungsten deposits on the bulb wall, the halogen gas transports it back to the filament – replenishing it, and keeping the bulb clean and bright. The halogen gas actually regenerates the filament. This is why halogen bulbs last longer and stay bright 85% of its life. However, the tungsten does not go back exactly to the same spot on the filament, so eventually it gets weak at one point and fails, ending the cycle. Halogen bulbs are available for low voltage (12V) operation (for which a transformer is required) or for 120 volt as direct replacements for incandescent lamps



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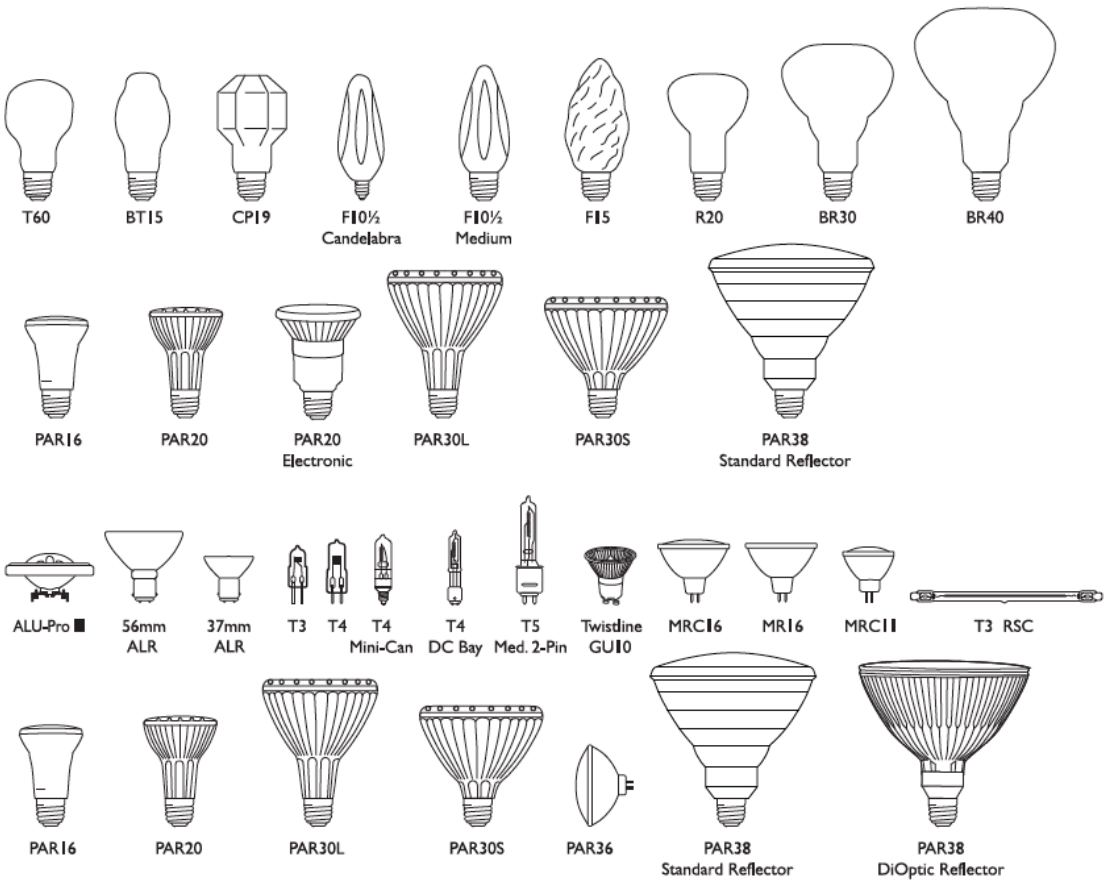
POSSIBLE BULB SHAPES



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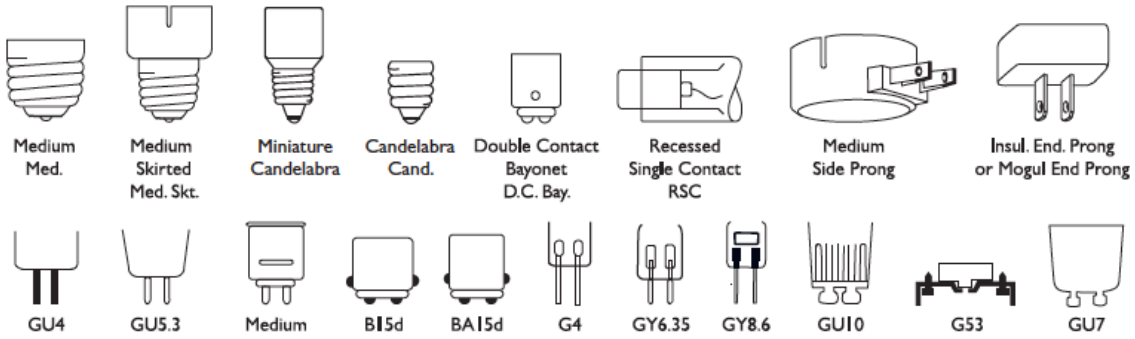

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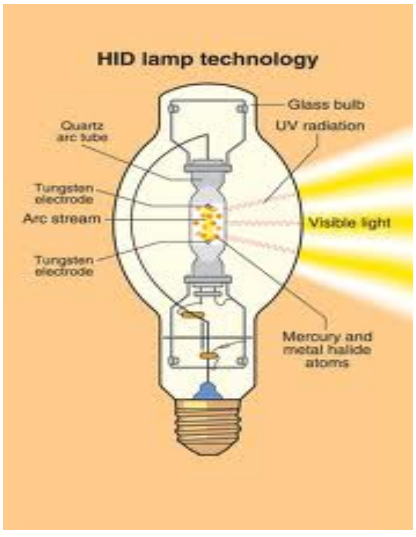
UNDERSTANDING
HID BULBS



Mercury Vapor

Mercury Vapor lamps feature low initial cost, but have higher operating costs than HPS or Metal Halide due to its lower efficiency. The clear mercury bulb has a bluish green appearance and the white mercury bulb has a higher color rendering. Mercury lamps become dimmer over time and rarely burn out, so it is wise to replace them to restore light levels. Mercury lamps are used for landscape lighting, dusk to dawn fixtures, roadway, parking lots, floodlight, and security.

Metal Halide

Metal Halide lamps are the fastest growing segment of the HID family due to their crisp white light, high efficiency, and good color rendering. Because of their good color rendering, Metal Halide lamps are used in interior as well as exterior applications. Metal Halide lamps are used extensively in shopping malls, retail commercial buildings, roadway lighting, parking lots, airports, sport stadium lighting, and building flood lighting.

High Pressure Sodium

High Pressure Sodium lamps are the most efficient HID lamps available. If color rendering is not critical and energy saving is important, HPS is an excellent choice. HPS lamps also attract less insects than other light sources. HPS fixtures cycle on and off when it is time to replace the bulb. Applications include security lighting, dusk-to dawn fixtures, parking lots, flood lighting, roadway, and industrial/ commercial installations.

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POSSIBLE BULB TYPES

POSSIBLE BASE TYPES