



Halogen Lighting

by Bruce Sullivan

Halogen lights have been sneaking onto the shelves of your local retailers for several years. Many look similar to "regular" light bulbs until you look at the price tag.

After a new federal law takes effect in 1995, you'll be seeing a lot more halogens. The Federal Energy Policy Act of 1992 set minimum efficiency standards for light bulbs (technically called lamps). These standards will eliminate many less efficient lamps now on the market. Many familiar reflectors (parabolic aluminum reflectors, or PAR lamps) will disappear. Halogen products will fill the gaps.

Tungsten halogen lamps offer

several advantages:

- They use 10% to 40% less energy than traditional incandescents.
- The color is "whiter" and sharper.
- They last longer, typically from 2,000 to 4,000 hours, compared to 1,000 to 2,000 hours for common incandescents.
- They light immediately without flicker, and most can be dimmed.
- Light output remains high at the end of their service life. Traditional incandescents get fainter and blacken with age.
- Directional halogens (PARs and MR16s) offer a tighter, more distinct light beam.
- They contribute less excess heat to the building, which can reduce cooling costs.

The Halogen Cycle

The filaments in all incandescent lamps are made from tungsten. Electric current running through the filament heats the metal until it glows. In the traditional incandescent lamp, the intense heat gradually vaporizes the tungsten. You can see the black tungsten deposits on the inside of the glass "bulb." After many hours of burning, the filament loses so much material that it burns up at its thinnest point.

With halogen lamps, the operating

principle has been refined. The tungsten filament is surrounded by a halogen gas (usually bromine or iodine). As the filament burns, tungsten vaporizes. Instead of blackening the glass, it combines with the halogen gas. This combined gas migrates back to the hot filament, where the tungsten splits off and renews the filament. This "halogen cycle" slows filament erosion, which helps give the lamp its longer life. (Higher pressure within the capsule also helps.)

To operate, the halogen cycle requires a temperature of about 200°C. This high temperature results in the slightly greater efficiency and "whiter" color.

Quartz Halogen

A "capsule" encloses the filament and halogen gas (see illustration, below left). To withstand the high temperature the capsule is often made of quartz glass. Quartz glass is relatively inexpensive, but has a drawback. It allows ultraviolet (UV) light to escape. This is harmful to people only when they're exposed for hours at a time. Many products contain a capsule made from borate silica hard glass (a familiar brand name is Pyrex). This blocks much of the UV light.

Whether made from quartz or hard glass, the capsule is fragile. You should never touch the capsule with your bare hands, because skin oil can cause the glass to break. If a capsule ruptures, the extremely hot fragments can cause severe burns. Several products place the capsule inside an outer glass jacket. Other lamps leave the capsule exposed. These may be installed only in fixtures with lenses or screens.

Infrared Coatings

General Electric makes a PAR lamp called *Halogen IR*. A coating on the capsule reflects heat (infrared energy) back to the filament, making it burn hotter. A comparison of PAR 38 bulbs shows that you get the same light output from a standard 120-watt bulb, a 90-watt halogen, and a 60-watt halogen with an infrared coating. The halogens save 25% and 50% energy, respectively.

Low Voltage

Low-voltage lighting systems that use the MR16 lamps are common in store displays and high-end homes. Although costly, their small size makes them more energy efficient than other halogens. They also last longer than halogens that are designed for line voltage.

On the down side, a low-voltage system requires a transformer. This can be built into the housing that holds the lamp, or located in a wall or ceiling cavity.

Dimming

Most halogens can be dimmed.

However, constant dimming can dramatically reduce lamp life. Dimming reduces the temperature of the lamp and interferes with the halogen cycle. If you dim, be sure to operate the lamp at full power for 15 to 30 minutes once per week.

Some manufacturers add a diode to their standard line-voltage halogen lamps. The diode reduces the voltage going to the filament. This has advantages for the lamp, but may cause two complications if you attach the lamp to a dimmer. First, the lamp itself may flicker. Second, the lamp or the dimmer may simply not work.

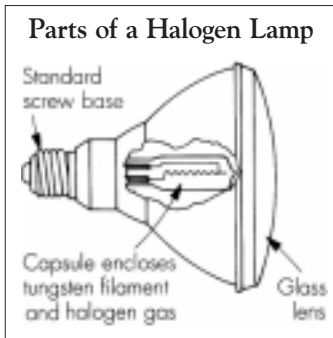
Don't bother to look at the package, because it won't tell you if a diode is present. Calls to three major manufacturers revealed this: General Electric doesn't use diodes in any of their halogen products. Sylvania is phasing out diodes, so only their Designer 16 and 60-watt PAR 38 lamps have them. All of Phillips' PAR lamps use diodes. This situation could change any time. Contact the manufacturer for up-to-date information.

When to Choose Halogen

Halogens are more efficient than other incandescent lamps. However, they don't provide nearly the same efficiency or service life offered by compact fluorescents. The best reasons to choose halogens are aesthetic. The bright, higher-contrast light is excellent for reading. And halogens illuminate color and true skin tones exceptionally well, so they are a good choice in bathrooms, or for displaying art. Most are easy to dim, as long as they don't have a diode. Halogens fit a wide variety of fixtures, because they're widely available with the standard medium screw base.








If you mix incandescent and fluorescent lights in the same space, however, the colors of the lamps need to be balanced. A good combination is a tungsten-halogen and a 3,000K fluorescent. ■

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Modern halogen lamps fit standard light sockets. The inner capsule, which contains the filament and halogen gas, is extremely fragile, so it is protected by the glass lens.

Halogen Lamp Types

Lamp type	Use
Linear 	Outdoor security, torchiere lamps
Mid-break 	Lamps, pendants, sconces
Multi-faceted reflector MR 16 	Track lights, spot lights
Multi-faceted reflector MR 16 	Track lights, 12 volts only
Parabolic aluminum reflector PAR 20 	Track lights, recessed downlights
Parabolic aluminum reflector PAR 30 	Track lights, recessed downlights
Parabolic aluminum reflector 	Outdoor security

Halogen lamps are available in these standard lamp configurations.

Product Information

GE Lighting
Nela Park #4165
Cleveland, OH 44112
800/626-2000

Osram/Sylvania
100 Endicott St.
Danvers, MA 01923
800/544-4828

Phillips Lighting Co.
P.O. Box 6800
Somerset, NJ 08875
210/563-3228