

# INFORMATION ON HALOGEN LAMPS

## How it works

A halogen lamp also uses a tungsten filament, but it is encased inside a much smaller quartz envelope. Because the envelope is so close to the filament, it would melt if it were made from glass. The gas inside the envelope is also different -- it consists of a gas from the halogen group. These gases have a very interesting property: They combine with tungsten vapor. If the temperature is high enough, the halogen gas will combine with tungsten atoms as they evaporate and redeposit them on the filament. This recycling process lets the filament last a lot longer. In addition, it is now possible to run the filament hotter, meaning you get more light per unit of energy. You still get a lot of heat, though; and because the quartz envelope is so close to the filament, it is extremely hot compared to a normal light bulb.

## Info on the Halogen light

### **1. How much heat (or infrared radiation) is emitted by regular, halogen, and compact fluorescent light bulbs?**

Because incandescent and halogen bulbs create light through heat, about 90% of the energy they emit is in the form of heat (also called infrared radiation). To reduce the heat emitted by regular incandescent and halogen light bulbs, use a lower watt bulb (like 60 watts instead of 100).

Fluorescent light bulbs use an entirely different method to create light. Both compact fluorescent bulbs and fluorescent tubes contain a gas that, when excited by electricity, hits a coating inside the fluorescent bulb and emits light. (This makes them far more energy efficient than regular incandescent bulbs.) The fluorescent bulbs used in your home emit only around 30% of their energy in heat, making them far cooler.

### **2. What is a halogen bulb?**

Halogen is a type of incandescent lamp. It has a tungsten filament just like a regular incandescent that you may use in your home, however the bulb is filled with halogen gas. When an incandescent lamp (one which produces light by heating a tungsten filament) operates, tungsten from the filament is evaporated into the gas of the bulb and deposited on the glass wall. The bulb "burns out" when enough tungsten has evaporated from the filament so that electricity can no longer be conducted across it. The halogen gas in a halogen lamp carries the evaporated tungsten particles back to the filament and re-deposits them. This gives the lamp a longer life than regular A-line incandescent lamps and provides for a cleaner bulb wall for light to shine through.

### **3. Why do halogen bulbs last longer than incandescent?**

The life of incandescent and halogen light bulbs, referred to as tungsten filament lamps, is limited by the state of the filament. The filament is the wire inside the bulb that produces light when heated. The light bulb will not work if the filament is broken which may occur as a result of the application of force, such as dropping the bulb, or by lack of tungsten in a particular area over the filament. During the operation of tungsten filament light bulbs, tungsten from the filament evaporates into the gas inside the light bulb. When the tungsten comes in contact with a cool surface it will condense. Often, with incandescent products, the tungsten condenses on the bulb wall. Because the tungsten is re-deposited on the wall instead of the filament, the filament grows thin over time. Eventually, there will be a point on the filament with so little tungsten that the filament will break and the light bulb will stop working.

Halogen light bulbs have a special gas inside their bulb containing halogens. The halogen gas facilitates the "halogen regenerative cycle" which means that the halogens carry the evaporated tungsten back to the filament instead of allowing it to deposit on the bulb wall. By placing the tungsten back on the filament instead of the wall, it delays the filament breaking due to lack of tungsten. Although the halogen cycle significantly increases the life of the light bulb, it cannot last forever because the halogen gasses cannot place the tungsten on a specific spot on the filament to avoid any place having too little tungsten and breaking.