

Sixty percent of all the fluorescent lamps sold in 2004 contained 10 milligrams of mercury or less. The remaining 40 percent contained between 10 and 100 mg of mercury.

Lamps used in sun tanning equipment contained an average 17 mg per lamp, with a high of 20 mg and a low of 5.5 mg. Germicidal lamps contained an average of 7.6 mg mercury, with a high of 70 and a low of 5.5 mg. Four foot linear fluorescent lamps contained an average of 13.3 mg, with a high of 70 mg and a low of 2.5 mg; while 4-foot TCLP-passing¹ lamps contained an average 5.3 mg with a high of 20 and a low of 1.4 mg.

Compact fluorescents had the least amount of mercury sold per lamp in 2004. Two-thirds contained 5 mg or less, while 96 percent contained 10 mg or less.

HID lamps as a class contained larger amounts of mercury in individual lamps sold in 2004. Of all the HID lamps, the MH lamps contained the largest amounts of mercury. Nearly three-quarters of the MH lamps contained between 50 and 1,000 mg of mercury.

Mercury short arc and mercury capillary lamps also contained larger amounts of mercury. Two-third of mercury short-arc lamps contained 100 to 1,000 mg of mercury with an additional 23 percent containing more than 1,000 mg. Mercury capillary lamps all contained greater than 100 mg of mercury.

¹ TCLP = Toxicity Characteristic Leaching Procedure. It is a Federal EPA test method that is used to characterize waste as either hazardous or non-hazardous for the purpose of disposal. The TCLP test measures the potential for mercury (or another chemical) to leach into groundwater from waste potentially disposed in a landfill. In the TCLP test, lamps are crushed into small pieces and mixed with an acidic solution. The acidic solution is then filtered from the lamp pieces. If less than 0.2 mg of mercury are found per liter of acidic test solution, the waste is characterized as non-hazardous waste under federal law.

Adapted from The Interstate Mercury Education & Reduction Clearinghouse (IMERC), a program of the Northeast Waste Management Officials' Association (NEWMOA).
<http://www.newmoa.org/prevention/mercury/imerc>



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Mercury in Lighting

Mercury is used in a variety of light bulbs, from fluorescent tubes to car headlights to neon signage. Although mercury is hazardous to human health and the environment, it is useful in lighting because it contributes to the bulbs' efficient operation and life expectancy. Fluorescent and other mercury-added bulbs are generally more energy efficient and last longer than incandescent and other equivalent forms of lighting. While the bulbs are being used, the mercury within them poses no health risk.

Mercury Lamp Disposal

At this time technology is not available to make general purpose, energy efficient light bulbs without mercury, although non-mercury bulbs have been recently developed for specific purposes, such as car headlights or store display lighting. Mercury-added bulbs should therefore be used, but managed as a hazardous waste, or else recycled, at the end of their useful life.

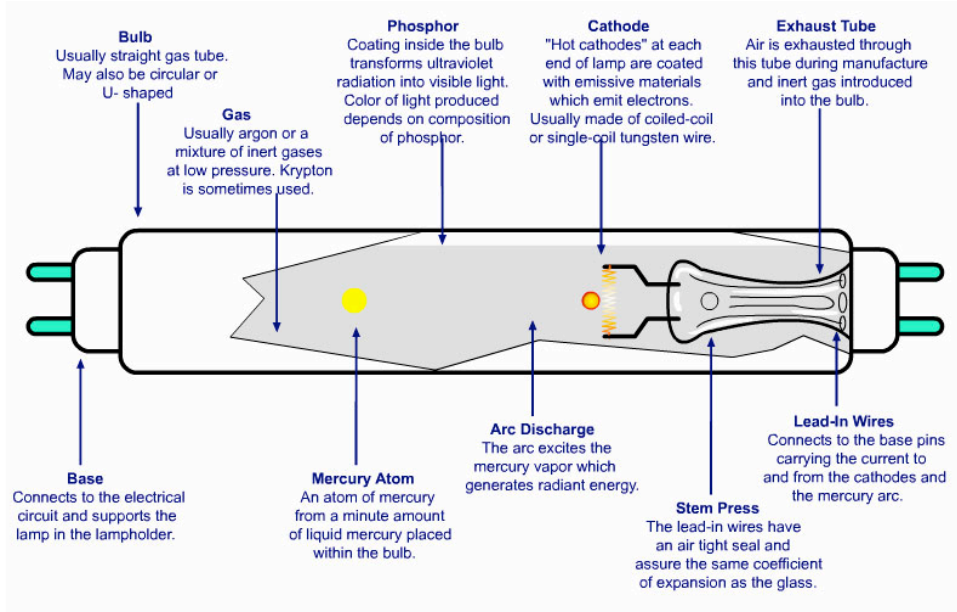
Mercury Lamp Types:

- ◆ fluorescent
- ◆ compact fluorescent
- ◆ high intensity discharge (includes metal halide, ceramic metal halide, high pressure sodium, and mercury vapor)
- ◆ mercury short arc (includes mercury and mercury xenon short arc lamps),
- ◆ capillary
- ◆ neon

Fluorescent A fluorescent lamp is an electrical discharge lamp that operates at a very low gas pressure. It produces light when electric current passes between two electrodes (also called cathodes) in a tube filled with low-pressure mercury vapor and inert gases such as argon and krypton. The electric current excites the mercury vapor in the tube, generating radiant energy, primarily in the ultraviolet (UV) range. The energy causes a phosphor coating on the inside of the tube to "fluoresce," converting the UV light into visible light. Mercury is present in the lamp in both the phosphor powder and in the vapor.

Fluorescent lamps require a ballast, which is a device used to provide, and control, the voltage in the lamp, as well as stabilize the current in the circuit.

Fluorescent lamps are more efficient than incandescent light bulbs of an equivalent brightness because more of the energy input is converted to usable light and less is converted to heat. They also have a longer lamp life.



How a fluorescent lamp works Northeast Lamp Recycling, Inc.

Typical types of fluorescent lamps include:

- ◆ linear (straight-shaped), U-tube (bent) and circline (circular-shaped)
- ◆ bug “zappers”
- ◆ high output
- ◆ tanning lamps
- ◆ black light
- ◆ germicidal
- ◆ cold cathode

Linear fluorescent, U-tube, and circline lamps are used for general illumination purposes. They are widely used in commercial buildings, schools, industrial facilities and hospitals.

Neon Lights

Neon lights are gas discharge bulbs that commonly contain neon, krypton, and argon gasses at low pressure. Neon emits red light; other gases emit other colors. For example, argon emits lavender and helium emits orange-white. The color of a “neon light” depends on the mixture of gases, the color of the glass, and other characteristics of the bulbs.

Red neon lights *do not* contain mercury. Almost every other color of “neon light” is produced using argon, mercury, phosphor, and other gases.

Neon lights are estimated to contain approximately 250 to 600 mg of mercury per bulb, depending on the manufacturer. A new product developed by Eurocom Inc. can reduce the amount of mercury used by 80 percent.

Amount of Mercury in Individual Lamps		
Lamp Type	Mercury in Lamp (mg)	Percent of Lamps with Specified Mercury Amount
Fluorescent	0 – 5	12
	> 5 – 10	48.5
	>10 – 50	27
	> 50 – 100	12.5
CFL Compact Fluorescent Lamp	0-5	66
	> 5 to 10	30
	>10-50	4
Metal Halide	>10 – 50	24
	>50 – 100	40
	>100 – 1,000	35
Ceramic Metal Halide	0 – 5	17.6
	>5 – 10	46.8
	> 10 – 50	35.6
High Pressure Sodium	>10 – 50	97
Mercury Vapor	>10 – 50	58
	>50 – 100	29
	>100 – 1,000	12
Mercury Short Arc	>100 – 1,000	65
	>1,000	23
Mercury Capillary	>100 – 1,000	100

Mercury Short-Arc lamps are spherical or slightly oblong quartz bulbs with two electrodes penetrating far into the bulb. The bulb is filled with argon and mercury vapor at low pressure. Wattage can range from under a hundred watts to a few kilowatts. With the small arc size and high power, the arc is extremely intense. Mercury short arc lamps are used for searchlights, specialized medical equipment, photochemistry, UV curing and spectroscopy. These lamps contain greater amounts of mercury, typically between 100 mg and 1000 mg. Nearly a quarter contain more than 1,000 mg.



Northeast Lamp Recycling, Inc.

Mercury short-arc metal halide lamps

Mercury Xenon Short-arc lamps operate similarly to mercury short-arc lamps but they contain a mixture of xenon and mercury vapor. They are used in industrial applications.



*Mercury Xenon Lamp
Northeast Lamp Recycling, Inc.*



*Mercury Capillary Lamp
Northeast Lamp Recycling, Inc.*

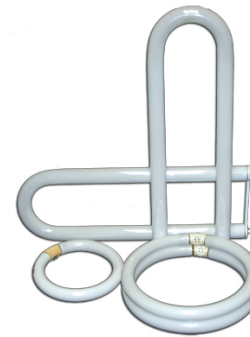
Mercury Capillary lamps provide an intense source of radiant energy from the ultraviolet through the near infrared range. These lamps are used for printed circuit boards, for UV curing, and for graphic arts. UV curing is widely used in silkscreening, CD/DVD printing and replication, medical manufacturing, bottle/cup decorating and converting/coating applications. These very specialized lamps contain 100 to 1,000 mg of mercury.



Germicidal Lamp



Tanning lamps



*U-tube and circline lamps
Northeast Lamp Recycling, Inc.*

High output fluorescent lamps (HO) are used in warehouses, industrial facilities and storage areas where bright lighting is necessary. HO lamps are also used for outdoor lighting, because of their lower starting temperature, and as grow lamps.

Cold cathode lamps are small diameter, fluorescent tubes that are used for backlighting in liquid crystal displays (LCDs) on a wide range of electronic equipment, including computers, flat screen TVs, cameras, camcorders, cash registers, digital projectors, copiers and fax machines.

Compact fluorescent lamps (CFL) use the same basic technology as linear fluorescent lamps, but are folded or spiralled in order to more approximate the physical volume of an incandescent bulb.

Individual CFLs generally contain less than 10 mg of mercury, with two-thirds containing less than 5 mg. A small percentage of CFLs contains between 10 and 50 mg of mercury.



Compact fluorescent lamps



Osram Sylvania and GE Lighting

High Intensity Discharge (HID) is the term commonly used for several types of lamps including metal halide, mercury vapor and high pressure sodium.

The names of the HID lamps (i.e., metal halide, mercury vapor and high pressure sodium) refer to the elements that are added to the gases (generally xenon or argon and mercury) in the lamp. HID lamps have very long life. Some emit far more lumens per fixture than typical fluorescent lights.

Metal Halide (MH) lamps use metal halides such as sodium iodide, and are commonly used in stadiums, warehouses, industrial settings, car headlights and aquarium lighting.



The amount of mercury used in individual MH lamps ranges from more than 10 mg to 1,000 mg, depending on power level. About one-third contain greater than 100 to 1,000 mg of mercury.

*Metal halide lamp
Northeast Lamp Recycling, Inc.*

Ceramic Metal Halide (CMH) lamps are used for “accent lighting,” retail lighting, and are useful in high volume spaces, with ceiling heights 14-30 feet. The arc tube is ceramic. CMH lamps contain less mercury than MH lamps. The majority contain from greater than 5 mg to 50 mg of mercury.

High Pressure Sodium (HPS) lamps are the most efficient light source commercially available, but tend to look yellow and provide poor color rendition. Their use is limited to outdoor and industrial applications where high efficiency and long life are priorities.



HPS lamps generally contain from more than 10 to 50 mg of mercury. A very small percentage contains more than 50 mg of mercury.

*High pressure sodium lamps
Osram Sylvania*

Mercury Vapor lighting is the oldest HID technology. Mercury vapor lamps have a lower light output and are the least efficient of HID lamps. These lamps are primarily used in industrial applications and outdoor lighting (i.e., security, roadway, and sports arenas) because of their low cost and long life (16,000 to 24,000 hours).

Mercury vapor lamps generally contain between 10 and 100 mg of mercury, however a small portion contains greater than 100 mg.



*Mercury vapor lamps
Osram Sylvania*