DRUM TOP CRUSHERS, A VIABLE ALTERNATIVE

INTRODUCTION

A Tale of MERCURY

It has been known for many years that **Mercury**, sometimes known as "quicksilver", has toxic properties. The expression "Mad as a Hatter" comes from the twitching and dementia once common among hatters who used to dip felt into mercuric nitrate to soften it. It is undoubtedly the inspiration for the Mad Hatter character in Lewis Carroll's "Alice in Wonderland".

Fluorescent Lighting – Part of our everyday lives

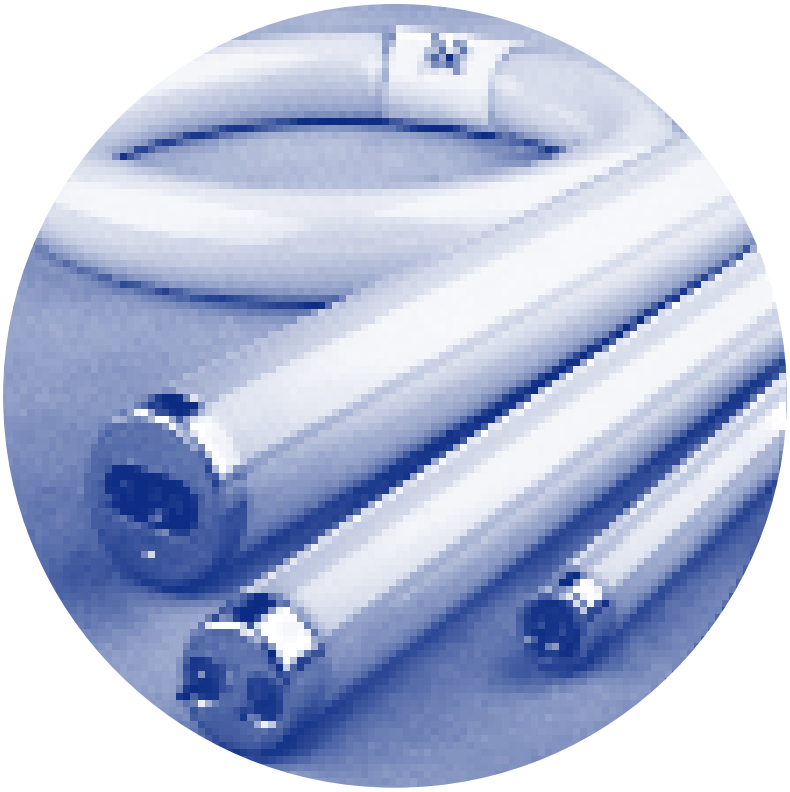
Fluorescent or High Intensity Discharge (HID) lighting is a good business choice. Compared to incandescent lighting, fluorescent and HID lighting use less energy and produce less heat. Less energy and heat not only result in lower lighting and cooling costs, but they also result in utility power plants emitting less air pollutants such as mercury, lead, nitrogen oxides, and sulfur dioxides. If you are considering switching to high-efficiency fluorescent or HID lighting, don't hesitate to make the change.

Although fluorescent and HID lighting save energy and money, they do present special disposal considerations. Fluorescent and HID lamps (as well as some types of neon lamps) contain mercury and in most cases are considered to be hazardous wastes when disposed. Mercury is a toxic metal that in certain forms can accumulate in living tissue and cause adverse health effects. Although the amount of mercury in each lamp is small, several million lamps are discarded by many businesses in the U.S., the U.K. and Europe each year, making these lamps one of the largest sources of mercury in our garbage. When a lamp is broken or placed in a landfill or incinerator, the mercury can contaminate the air, surface water, and ground water. Mercury contamination is most evident from the Department of Health's warnings of high mercury levels in fish in a number of our lakes and rivers.

Mercury is Harmful

Mercury, the harmful effects of which have been documented for decades, is an essential component of fluorescent and high intensity discharge lamps. These and other types of lamps, because they contain mercury, are considered hazardous waste when removed from service.

Determining whether a waste is hazardous is the responsibility of the generator through "knowledge of the product" or the toxicity characteristics leaching procedure test (TCLP). **Most fluorescent and high intensity discharge lamps (HIDs) fail the toxicity test for mercury and must be managed properly.**



DEFINITION

What is a Linear Fluorescent Tube or Lamp?

STANDARD LINEAR FLUORESCENT LAMPS: A low pressure mercury electric-discharge, straight-shaped source in which a fluorescing coating transforms some of the ultraviolet energy generated by the mercury discharge into visible light. Linear types include four-foot lamps, with a nominal overall length of 121.9 cm (48 in.), and eight-foot lamps, with a nominal overall length of 243.8 cm (96 in.). See fig. 1 for a diagram of a linear fluorescent lamp with the various parts mentioned.

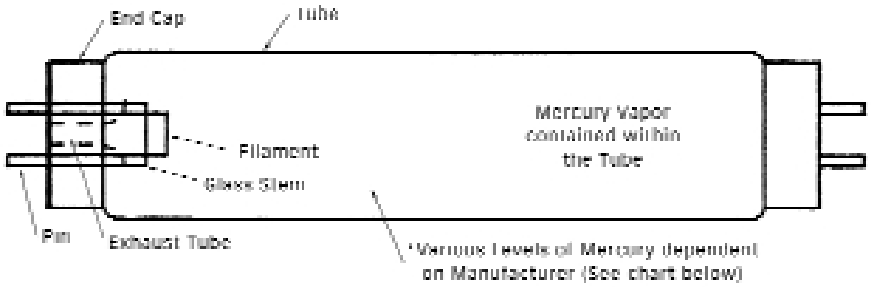
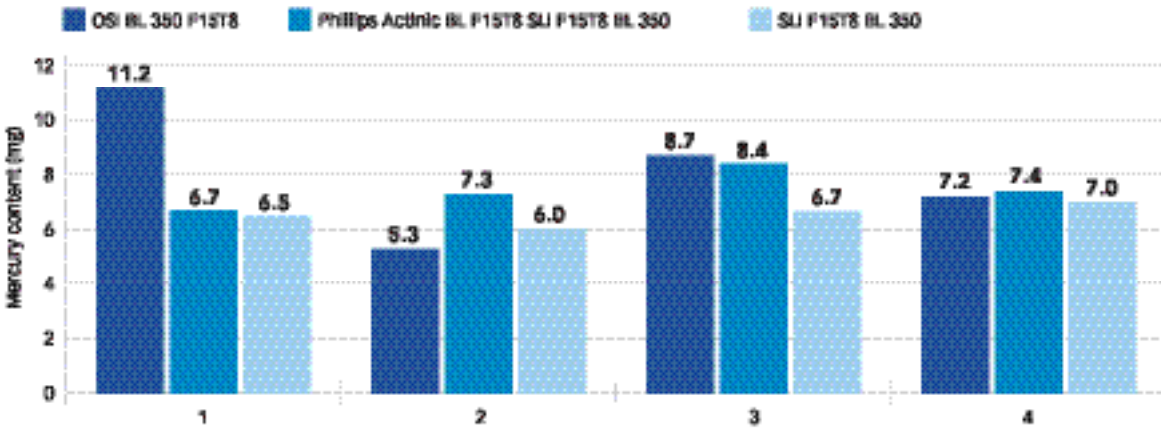


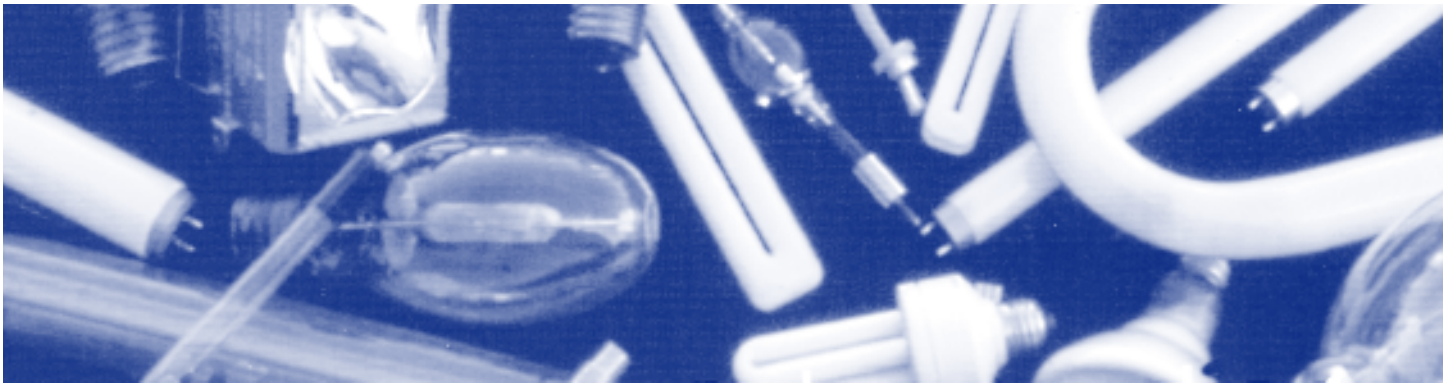
Fig. 1 – Standard Linear Fluorescent Lamp

Different levels of mercury in each lamp depending on manufacturer



	Menge Hg (mg)				Mount.. Hg. Dosing		
	1	2	3	4	Coil	Shield	Hg. Dosing
OSI BL 350 F15T8	11.2	5.3	8.7	7.2	Stick	No	direct liquid
Phillips Actinic BL F15T8	6.7	7.3	8.4	7.4	Triple	Yes	direct liquid
SLI F15T8 BL 350	6.5	6.0	6.7	7.0	Stick	No	

Fig. 2 – Mercury level determined by Cataphoresismethod



There are many different types and sizes of bulbs and tubes, but the components are essentially the same. Some typical mercury-containing lamps include: fluorescent, compact, v-shaped and shatter-proof or coated lamps, mercury vapor, HID sodium discharge lamps, metal halide, ultraviolet and arc lamps.

***Insect light traps contain special fluorescent tubes that must be recycled as well. Shatter-proof coatings and the bulb themselves, should be replaced and recycled once a year to maintain optimum effectiveness.**

What's in a lamp?

Neither the glass nor white powder (phosphors) in a fluorescent lamps are in themselves poisonous. The powder is not phosphorous as some think, but rather a mixture of minerals (that glow in the presence of ultraviolet light) that are a lot like clay. The powder does, however, get contaminated by the mercury in a lamp and should be avoided. When the lamps are broken up, you would notice a small cloud of the powder briefly seeping out of any openings. This is the mercury contaminated vapor releasing into the environment. This mercury-contaminated vapor is considered to be poisonous.

Mercury in the United States

There is a tiny ball of liquid mercury in each lamp which is very poisonous. The lamp interior is a vacuum, which holds or forms some mercury vapor, just as water evaporates forming water vapor. The amount of mercury is small and getting smaller every year. It runs about 40 milligrams a lamp on older lamps, and has been steadly reduced over the last 7 years to about 20 mg. or lower in a lamp today. This is about the size of a period on this page. About 1% of this mercury evaporates into the vacuum, forming a mercury vapor which carries the electricity down the length of the lamp. To give you a sense of scale, if you break one lamp in a 10-foot cube room, the mercury content of the air will rise to the level of mercury vapor allowed by OSHA and the national EPA for sustained operations. There is no standard for occasional vapor release (that we are aware of).

CONCERNS

Why are these lamps of environmental concerns?

ENVIRONMENTAL IMPACT – It is estimated that some 400 million fluorescent tubes and highway lamps are used annually in the U.S., U.K. and Europe. This equates to around 13,000 tons of material disposed to landfill, including some 12 tons of mercury.

Mercury is used in a wide variety of products including fluorescent tubes, sodium and mercury lamps, button cell batteries, dental amalgam, thermometers, manometers, pharmaceutical and agrochemical formulations, all resulting in mercurial waste.

As the mercury from one fluorescent tube can pollute 30,000 liters of water beyond a safe level for drinking, there are strong environmental reasons for proper management and recycling of these bulbs on a world-wide scale.

Why are these lamps considered hazardous?

Mercury, or "Quicksilver" as it is sometimes called, has traditionally been used in electrical devices, precision instruments, medical apparatus, and in conjunction with other elements to form compounds for industrial applications. Despite its widespread use, mercury is considered a hazardous waste. Devices that contain mercury must be managed properly when they are removed from service. Mercury is classified as one of several "heavy" metals. Wastes containing mercury are regulated under the Resource, Conservation and Recovery Act (RCRA).

In the U.S., many states classify certain mercury-devices as "**Universal Waste**", ***as long as they are destined for recycling.***

Its a fact: Mercury is poisonous and pollutes the environment.

Why recycle these lamps?

There are: **THREE CRITICAL CONCERNS:**

YOUR BUSINESS – Universal Waste regulations ban landfill of items containing mercury and other heavy metals, and mandate that they be properly recycled. Failure to comply leaves you liable for penalties, including:

- Fines up to $25,000 or more (In the U.S.)
- Damaged public image by not showing environmental responsibility
- Long-term liability for illegally-disposed of material

YOUR HEALTH – Mercury and other heavy metals can pose a serious health risk. The following warnings are in effect:

- Short-term exposure to high levels of mercury can cause lung damage, elevated blood pressure or heart rate.
- Long-term exposure to high levels of mercury can permanently damage the brain, kidneys, and developing fetuses.

YOUR ENVIRONMENT – Mercury contamination causes long-term damage to the environment. Even in apparently healthy areas, toxic metal poisoning can have underlying effects, such as:

- Fish consumption advisories issued in many states and countries due to high levels of mercury pollution.
- Contaminated bodies of water – one ounce of mercury will contaminate a lake for centuries.

SOLUTION

Recycling, the best option on a worldwide basis

Many recycling facilities are being established to help both public and private sector organizations to meet their environmental targets and obligations. In the U.S., R.C.R.A., state and local authorities have indicated that recycling is the preferred method, whenever possible, for the disposal of hazardous waste.

Recycling:

- **Keeps you in compliance with federal staff guidelines.**
- **It helps demonstrate your commitment to environmental best practice – proof of which is increasingly being demanded by customers and the general public.**
- **It provides a safe, convenient and efficient method of disposal, and reduces the volume of waste sent to landfill.**
- **It reduces risks to your personnel and property.**

The solution

Mercury recycling and reuse programs will reduce your environmental liability while showing your business' commitment to long-term environmental preservation.

Again, Why recycle?

Recycling is the best option for managing fluorescent and HID lamps, because it eliminates the risk of future financial liability associated with landfill disposal, and helps preserve our fragile Environment for the future.

RECYCLING REQUIREMENTS AND GUIDELINES

Management of Intentionally Crushed Mercury-Containing Lamps – U.S. Regulations and Guidelines

Mercury-containing lamps (spent lamps) may be crushed using a bulb crusher whether they are destined for recycling or destined for landfilling. This mixture of all major components of the lamp is called "crusher mercury-containing lamps" (or "crushed lamps").

Crushed lamps destined for recycling are regulated. Crushed lamps destined for landfilling are regulated under either federal hazardous waste regulations (Title 40 Code of Federal Regulations, Parts 260-268), or state solid waste regulations, depending on whether the lamps are a hazardous waste or not.

Crushed lamps may be sent for recycling, i.e. separation of the glass, metal and phosphor powders and subsequent reclamation of mercury for recycling. If the crushed lamps are sent to a mercury recovery facility that is permitted, a hazardous waste determination (40 CFR 262.11) is not required. If the crushed lamps are sent to a recycling facility in another state, other than the state you are in, that state may have other requirements, including a hazardous waste determination. Check with the state in which the recycling facility is located for applicable requirements. This would apply to a country, or province as well.

If the crushed lamps are destined for landfill disposal, a hazardous waste determination is first required. The hazardous waste determination for mercury-containing lamps would typically require analysis of each and every drum or container of crushed lamps using the Toxicity Characteristic Leaching Procedure (TLCP). If the crushed lamps are a hazardous waste, i.e., the TCLP value for mercury is 0.2 milligrams/liter (mg/l) or greater, then the lamps must be sent to a landfill permitted to receive hazardous wastes. If the crushed lamps are not a hazardous waste, i.e., the TCLP value for mercury is less than 0.2 mg/l, then the lamps may be sent to a municipal solid waste landfill, if the county solid waste department and landfill operator agree to accept the crushed lamps. The crushed lamps may not, under any circumstances, be sent to unlined landfills such as a construction and demolition landfill. Crushed lamps may not be sent to a municipal solid waste combustor (incinerator) under any circumstances since that is prohibited.

Local, State and your Regulatory Agencies regarding specific recycling requirements and guidelines.

RECYCLING REQUIREMENTS AND GUIDELINES continued

Summary

The materials that result from crushing mercury-containing lamps using a bulb crusher are not just "glass" but are "crushed mercury-containing lamps" (crushed lamps"), i.e., a mixture of all the major components, including mercury, of the mercury-containing lamps that have been crushed. U.S. laws prohibits the disposal of "crushed lamps" in municipal solid waste landfills unless TCLP testing for mercury on each drum or container shows that they are not hazardous wastes. U.S. laws also prohibits the disposal of "crushed lamps" in either an unlined landfill or a waste combustor (incinerator) under any circumstances. ***One major benefit from using a drum top bulb crushing machine is volume reduction and ease in handling. This alone is very cost effective in proper managing and recycling fluorescent tubes and other type of mercury bearing lamps.***

Sources of information:

- USEPA - United States Environmental Protection Agency
- FDEP - Florida Department of Environmental Protection

Drum-Top Crusher Requirements

Most recycling facilities accept crushed lamps. Use of bulb crusher equipment is allowed by generator as long as the crushed lamps immediately enter the final accumulation container (**THE DISPOSAL DRUM**) from the drum-top crusher equipment, and crushing is done under the following conditions:

- Crushing poses no threat to employee health and environmental risks if mercury vapors are released. Releases of mercury vapors or other contaminants shall be prevented, and the user shall comply will all applicable OSHA and ACGIH standards.
- The crushing unit shall be properly maintained (e.g., adequate filter changes), operated per the manufacturer's written procedures, and the employees using this equipment shall be thoroughly trained and familiar with these procedures. Maintenance on some of the newest units is easy and very cost effective

Record Keeping Guidelines for Generators and Handlers

- Obtain and keep receipts for shipments of lamps off-site to show DEP (Department of Environmental Protection) and local inspectors that lamps were properly handled. Receipts should have the following information: the quantity of lamps shipped or received, the date of shipment or receipt, and the name and address of the handler or recycling facility receiving any shipped lamps.
- Records of receipts and shipments of lamps are required for large quantity handler facilities (including generators) and shall be kept for 3 years from the date of shipment or receipt.
- "***Certificate of Recycling***" retained as proof of properly completing the recycling process.

Proper Documentation should include:

- **Bill of Lading – United States.**
- **Non Hazardous manifest indicating crushed glass is destined for recycling – United States.**
- **Certificate of Recycling from processing facility – United States**

ALWAYS RECYCLE WHENEVER YOU CAN