



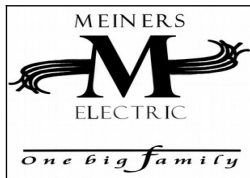
## 1. POLICY

The electrical industry poses many hazards by the sheer number of substances used. Meiners Electric is committed to providing information of these hazards to their employees as they become available.

## 2. GENERAL

The table below identifies many hazardous materials that are associated with the electrical industry and all employees need to be made aware of these hazards.

Substance	Occurrence
<b>Halogenated compounds:</b>	
- PCB (polychlorinated biphenyls)	Condensers, Transformers
- TBBA (tetrabromo-bisphenol-A) - PBB (polybrominated biphenyls) - PBDE (polybrominated diphenyl ethers)	Fire retardants for plastics (thermoplastic components, cable insulation) TBBA is presently the most widely used flame retardant in printed wiring boards and casings.
- PVC (polyvinyl chloride)	Cable insulation
<b>Heavy metals and other metals:</b>	
- Arsenic	Small quantities in the form of gallium arsenide within light emitting diodes
- Barium	Getters in <a href="#">CRT</a>
- Beryllium	Power supply boxes which contain silicon controlled rectifiers and x-ray lenses
- Cadmium	Rechargeable NiCd-batteries, fluorescent layer (CRT screens), printer inks and toners, photocopying-machines (printer drums)
- Chromium VI	Data tapes, floppy-disks
- Lead	CRT screens, batteries, printed circuit boards
- Lithium	Li-batteries
- Mercury	Fluorescent lamps that provide backlighting in LCDs, in some alkaline batteries and mercury wetted switches
- Nickel	Rechargeable NiCd-batteries or NiMH-batteries, electron gun in CRT
- Rare Earth elements (Yttrium, Europium)	Fluorescent layer (CRT-screen)
- Zinc sulphide	Interior of CRT screens, mixed with rare earth metals
<b>Radio-active substances</b>	
- Americium	Medical equipment, fire detectors, active sensing element in smoke detectors



### 3. HANDLING AND DISPOSAL

Refer to the specific Material Safety Data Sheet (MSDS) for proper handling, storage and disposal of hazardous materials. If working on a client site, ensure that the client is aware of the materials and hazards.

### 4. HAZARDS ASSOCIATED WITH THE ELECTRICAL TRADE

#### 1. Arsenic

Arsenic is a poisonous metallic element which is present in dust and soluble substances. Chronic exposure to arsenic can lead to various diseases of the skin and decrease nerve conduction velocity. Chronic exposure to arsenic can also cause lung cancer and can often be fatal.

#### 2. Barium

Barium is a metallic element that is used in spark-plugs, fluorescent lamps and "getters" in vacuum tubes. Being highly unstable in the pure form, it forms poisonous oxides when in contact with air. Short-term exposure to barium could lead to brain swelling, muscle weakness, damage to the heart, liver and spleen. Animal studies reveal increased blood pressure and changes in the heart from ingesting barium over a long period of time. The long-term effects of chronic barium exposure to human beings are still not known due to lack of data on the effects.

#### 3. Beryllium

Beryllium has recently been classified as a human carcinogen because exposure to it can cause lung cancer. The primary health concern is inhalation of beryllium dust, fume or mist. Workers who are constantly exposed to beryllium, even in small amounts, and who become sensitized to it can develop what is known as Chronic Beryllium Disease (berylliosis), a disease which primarily affects the lungs. Exposure to beryllium also causes a form of skin disease that is characterized by poor wound healing and wart-like bumps. Studies have shown that people can still develop beryllium diseases even many years following the last exposure.

#### 4. Brominated flame retardants (BFRs)

The 3 main types of BFRS used in electronic and electrical appliances are Polybrominated biphenyl (PBB), Polybrominated diphenyl ether (PBDE) and Tetrabromobisphenol - A (TBBPA). Flame retardants make materials, especially plastics and textiles, more flame resistant. They have been found in indoor dust and air through migration and evaporation from plastics. Combustion of halogenated case material and printed wiring boards at lower temperatures releases toxic emissions including dioxins which can lead to severe hormonal disorders. Major electronic manufacturers have begun to phase out brominated flame retardants because of their toxicity.



## 5. Cadmium

Cadmium components may have serious impacts on the kidneys. Cadmium is adsorbed through respiration but is also taken up with food. Due to the long half-life in the body, cadmium can easily be accumulated in amounts that cause symptoms of poisoning. Cadmium shows a danger of cumulative effects in the environment due to its acute and chronic toxicity. Acute exposure to cadmium fumes causes flu-like symptoms of weakness, fever, headache, chills, sweating and muscular pain. The primary health risks of long term exposure are lung cancer and kidney damage. Cadmium also is believed to cause pulmonary emphysema and bone disease (osteomalacia and osteoporosis).

## 6. CFCs (Chlorofluorocarbons)

Chlorofluorocarbons are compounds composed of carbon, fluorine, chlorine, and sometimes hydrogen. Used mainly in cooling units and insulation foam, they have been phased out because when released into the atmosphere, they accumulate in the stratosphere and have a deleterious effect on the ozone layer. This results in increased incidence of skin cancer in humans and in genetic damage in many organisms.

## 7. Chromium

Chromium and its oxides are widely used because of their high conductivity and anti corrosive properties. While some forms of chromium are non toxic, Chromium (VI) is easily absorbed in the human body and can produce various toxic effects within cells. Most chromium (VI) compounds are irritating to eyes, skin and mucous membranes. Chronic exposure to chromium (VI) compounds can cause permanent eye injury, unless properly treated. Chromium VI may also cause DNA damage.

8. **Dioxins** Dioxins and furans are a family of chemicals comprising 75 different types of dioxin compounds and 135 related compounds known as furans. Dioxins is taken to mean the family of compounds comprising polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs). Dioxins have never been intentionally manufactured, but form as unwanted by-products in the manufacture of substances like some pesticides as well as during combustion. Dioxins are known to be highly toxic to animals and humans because they bio-accumulate in the body and can lead to malformations of the fetus, decreased reproduction and growth rates and cause impairment of the immune system among other things. The best-known and most toxic dioxin is 2,3,7,8-tetrachlorodibenzo-p-dioxin ([TCDD](#)).

## 9. Lead

Lead is the fifth most widely used metal after iron, aluminum, copper and zinc. It is commonly used in the electrical and electronics industry in solder, lead-acid batteries, electronic components, cable sheathing, in the glass of CRTs etc. Short-term exposure to



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high levels of lead can cause vomiting, diarrhea, convulsions, coma or even death. Other symptoms are appetite loss, abdominal pain, constipation, fatigue, sleeplessness, irritability and headache. Continued excessive exposure, as in an industrial setting, can affect the kidneys. It is particularly dangerous for young children because it can damage nervous connections and cause blood and brain disorders. (Specifics are available in the following section and in our lead awareness section (SP-LEAD))

#### 10. **Mercury**

Mercury is one of the most toxic yet widely used metals in the production of electrical and electronic applications. It is a toxic heavy metal that bio accumulates causing brain and liver damage if ingested or inhaled. In electronics and electrical appliances, mercury is highly concentrated in batteries, some switches and thermostats, and fluorescent lamps.

#### 11. **Polychlorinated biphenyls (PCBs)**

Polychlorinated biphenyls (PCBs) are a class of organic compounds use in a variety of applications, including dielectric fluids for capacitors and transformers, heat transfer fluids and as additives in adhesives and plastics. PCBs have been shown to cause cancer in animals. PCBs have also been shown to cause a number of serious non-cancer health effects in animals, including effects on the immune system, reproductive system, nervous system, endocrine system and other health effects. PCBs are persistent contaminants in the environment. Due to the high lipid solubility and slow metabolism rate of these chemicals, PCBs accumulate in the fat-rich tissues of almost all organisms (bio accumulation). The use of PCBs is prohibited in [OECD](#) countries, however, due to its wide use in the past, it still can be found in waste electrical and electronic equipment as well as in some other wastes.

#### 12. **Polyvinyl chloride (PVC)**

Polyvinyl chloride (PVC) is the most widely-used plastic, used in everyday electronics and appliances, household items, pipes, upholstery etc. PVC is hazardous because contains up to 56 percent chlorine which when burned produces large quantities of hydrogen chloride gas, which combines with water to form hydrochloric acid and is dangerous because when inhaled, leads to respiratory problems.

#### 13. **Selenium**

Exposure to high concentrations of selenium compounds cause selenosis. The major signs of selenosis are hair loss, nail brittleness, and neurological abnormalities (such as numbness and other odd sensations in the extremities).

### 5. **HAZARDS ASSOCIATED WITH THE JOB SITE**



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## 1. HEXAVALENT CHROMIUM

### Description

Industrial uses of hexavalent chromium compounds include chromate pigments in dyes, paints, inks, and plastics; chromates added as anti corrosive agents to paints, primers, and other surface coatings; and chromic acid electroplated onto metal parts to provide a decorative or protective coating. Hexavalent chromium can also be formed when performing "**hot work**" such as welding on stainless steel or melting chromium metal. In these situations the chromium is not originally hexavalent, but the high temperatures involved in the process result in oxidation that converts the chromium to a hexavalent state.

### Health Effects

Workers who breathe hexavalent chromium compounds at their jobs for many years may be at increased risk of developing lung cancer. Breathing high levels of hexavalent chromium can irritate or damage the nose, throat, and lungs. Irritation or damage to the eyes and skin can occur if hexavalent chromium contacts these organs in high concentrations or for a prolonged period of time.

### Means of Exposure

As mentioned above, hexavalent chromium is a byproduct of "hot-work" which includes welding, cutting, grinding, sand blasting, scaling and gouging.

### Exposure Control

There are several ways to reduce exposure to hexavalent chromium. Recommended controls vary from operation to operation. The preferred approach is to use engineering controls such as ventilation or equipment and process modification. If these controls are not sufficient, other controls may be implemented, including the use of respirators, eye protection, showering, and changing into street clothes before leaving the plant.

## 2. CRYSTALLINE SILICA

### Description

Crystalline silica is a basic component of soil, sand, granite, and any other minerals. Quartz is the most common form of crystalline silica. Cristobalite and tridymite are two other forms of crystalline silica. All three forms may become respirable size particles when workers chip, cut, drill, or grind objects that contain crystalline silica.

### Health Effects

Silicosis is a disabling, non-reversible and sometimes fatal lung disease caused by overexposure to



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respirable crystalline silica. Silica exposure remains a serious threat to nearly two million US workers. The National Institute for Occupational Safety and Health (NIOSH) reports that each year more than 250 die from silicosis and hundreds more are disabled. There is no cure for the disease, but it is 100 percent preventable if employers, workers, and health professionals work together to reduce exposures.

### **Means of Exposure**

Crystalline silica can be generated by the cutting, drilling, demolition and core drilling of concrete and other silica containing materials on job-sites.

### **Exposure Control**

Controlling the exposure to silica may be done through engineering controls, administrative actions, and personal protective equipment. Engineering controls include such things as replacing silica with a material that does not contain crystalline silica, using local exhaust ventilation, using containment methods such as blast-cleaning machines and cabinets, **and wet sawing, or wet drilling of silica-containing materials**. Administrative actions may include limiting the worker's exposure time and requiring workers to shower and change into clean clothes before leaving the worksite. Personal protective equipment may include wearing the proper respiratory protection to keep workers' exposure below the OSHA permissible exposure limit and the use of personal protective clothing.

## **3. LEAD**

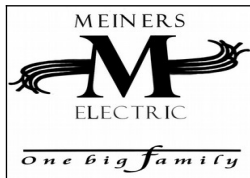
### **Description**

Lead is a naturally occurring, bluish-gray metal that is found in small quantities in the earth's crust. Lead is used in the manufacture of batteries, metal products, paints, and ceramic glazes.

### **Health Effects**

Lead adversely affects numerous body systems and causes forms of health impairment and disease that arise after periods of exposure as short as days (acute exposure) or as long as several years (chronic exposure). The frequency and severity of medical symptoms increases with the concentration of lead in the blood. Common symptoms of acute lead poisoning are loss of appetite, nausea, vomiting, stomach cramps, constipation, difficulty in sleeping, fatigue, moodiness, headache, joint or muscle aches, anemia, and decreased sexual drive. Acute health poisoning from uncontrolled occupational exposures has resulted in fatalities. Long term (chronic) overexposure to lead may result in severe damage to the blood-forming, nervous, urinary, and reproductive systems.

### **Means of Exposure**



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Lead can be found in electrical devices (lead based solders), batteries and other components. Lead can also be found as gasket material, paints and finishes and radiation shielding.

### **Exposure Control**

The most effective way to protect workers is to minimize their exposure through engineering controls, good work practices and training, and the use of personal protective clothing and equipment, including respirators, where required. Engineering controls include material substitution, isolation, process/equipment modification and local ventilation. Some fundamental and easily implemented work practices are good housekeeping, appropriate personal hygiene practices, periodic inspection and maintenance of process and control equipment, proper procedures to perform a task, and appropriate supervision to ensure that the proper procedures are followed.

#### **4. ABESTOS**

##### **Description**

Asbestos is well recognized as a health hazard and is highly regulated. An estimated 1.3 million employees in the construction and general industry face significant asbestos exposure on the job. Heaviest exposures occur in the construction industry, particularly during the removal of asbestos during renovation or demolition. Employees are also likely to be exposed during the manufacture of asbestos products (such as textiles, friction products, insulation, and other building materials) and during automotive brake and clutch repair work.

##### **Health Effects**

Asbestos workers have increased chances of getting two principal types of cancer: cancer of the lung tissue itself and mesothelioma, a cancer of the thin membrane that surrounds the lung and other internal organs. These diseases do not develop immediately following exposure to asbestos, but appear only after a number of years. The following documents describe the health hazards of asbestos and how to recognize it.

##### **Means of Exposure**

Because electricians often work in buildings that were constructed during the years in which the construction industry made heavy use of asbestos-containing products, there is a high risk of exposure to asbestos. Electrical insulation products are not the only source of asbestos exposure for electricians, however.

Wiring is most often concealed in and behind walls, which means that in order to reach wiring that needs repairs, electricians must often cut holes in walls and dig through asbestos-containing drywall and insulation. If the building in which they are working was built before 1980, electricians face the risk of inhaling asbestos dust as they work.

Asbestos can be found in





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- Acoustical plaster
- Decorative plaster
- Ceiling tiles
- Electrical panel partitions
- Electrical ducts
- Electric wiring insulation
- Textured paints
- Cement siding
- Cement wallboard
- Drywall
- Drywall compound
- Sheetrock
- Thermal paper products
- Electrical cloth

**Exposure Control**

Controlling the exposure to asbestos can be done through engineering controls, administrative actions, and personal protective equipment (PPE). Engineering controls include such things as isolating the source and using ventilation systems. Administrative actions include limiting the workers exposure time and providing showers. Personal protective equipment include wearing the proper respiratory protection and clothing.

**No employee shall disturb asbestos containing materials.**

If asbestos-containing material is found or suspected, STOP WORK and notify the job foreman. Abatement and control must be performed by trained and qualified personnel before work can be restarted.

**5. MERCURY****Description**

Mercury is naturally occurring and exists in several forms. High mercury exposure results in permanent nervous system and kidney damage. Exposure is most likely to occur during mining, production, and transportation of mercury, as well as mining and refining of gold and silver ores.

**Health Effects**

The nervous system is very sensitive to all forms of mercury. Methylmercury and metallic mercury vapors are more harmful than other forms, because more mercury in these forms reaches the brain. Exposure to high levels of metallic, inorganic, or organic mercury can permanently damage the brain, kidneys, and developing fetus. Effects on brain functioning may result in irritability,





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shyness, tremors, changes in vision or hearing, and memory problems.

Short-term exposure to high levels of metallic mercury vapors may cause effects including lung damage, nausea, vomiting, diarrhea, increases in blood pressure or heart rate, skin rashes, and eye irritation.

### **Means of Exposure**

Mercury is commonly found in thermometers, manometers, barometers, gauges, valves, switches, batteries, fluorescent light bulbs and high-intensity discharge (HID) lamps. It is also used in amalgams for dentistry, preservatives, heat transfer technology, pigments, catalysts, and lubricating oils.

### **Exposure Control**

Controlling mercury exposure is best accomplished through substituting it with a non-toxic chemical, depending on the application. If this cannot be done, engineering, administrative, and personal protective equipment (PPE) should be used.