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Lead Soldering Safety Guidelines

This document provides safety precautions for lead soldering operations, although the majority of information will also apply to operations using other types of solder.

Introduction

Lead (Pb) is a known neurotoxin and an exposure may cause significant chronic health effects, such as reproductive problems, digestive problems, memory and concentration problems, muscle and joint pain. Therefore, solder that contains lead is considered to be hazardous. If lead-containing soldering material is not safely handled, faculty or students may be inadvertently exposed. However, when the solder is handled and treated appropriately, there is minimal exposure hazard.

Potential exposure routes from soldering include ingestion of lead due to surface contamination. The digestive system is the primary means by which lead can be absorbed into the human body. Skin contact with lead is harmless, but lead dust on your hands or under your fingernails can be ingested if you don't wash your hands or under fingernails before eating, smoking, etc. Ingesting even a small amount of lead is dangerous because it is a cumulative toxin that is not excreted by normal bodily function.

Soldering with lead (or other metals used in soldering) may produce fumes that contain solvents, aliphatic aldehydes and acids that are hazardous. In addition, using flux containing rosin (also called colophony) produces solder fumes.

WARNING: Inhaling fumes can result in occupational asthma or make existing asthmatic conditions worsen. The fumes can also cause eye and upper respiratory tract irritation.

It is not expected occasional soldering activities that take place within areas that are well ventilated or have additional local exhaust ventilation will pose an occupational hazard to students or faculty. However, it is advised to implement best practices regardless of the frequency and duration of soldering. Please contact Liz Dobson-Davis, EHS Compliance Officer, at 388-6340 or dobsonde@union.edu if you have any questions or concerns.

General Safety Precautions

1. Soldering Iron Safety

Never touch the element or tip of the soldering iron. It is very hot (about 400°C) and will burn.

Hold wires to be heated with tweezers, pliers or clamps to avoid receiving burns from objects that are heated.

Keep the cleaning sponge wet during use.

To the extent possible, conduct soldering on a solid, level surface and always return the soldering iron to its stand when not in use. Never put it down on your workbench.

Turn unit off or unplug the iron when not in use. Soldering stations that feature an automatic shut off not only extend the life of tip, iron and station, but provide an additional measure of fire safety.

2. Working with Solder, Flux and Cleaners

Follow manufacturer's instructions and read and understand the Safety Data Sheets for all materials before beginning work.

Wear eye protection. Solder can "spit."

Use lead free (preferable) or low lead solder whenever possible.

Keep cleaning solvents in dispensing bottles to reduce inhalation hazards.

Always wash your hands with soap and water after soldering.

3. Reduce Risk of Personal Exposure

Avoid ingestion of lead surface contamination by keeping soldering areas clean and properly managing lead soldering waste (see Section 8). Remember to clean your work area daily. Wipe your work area with a wet rag or with Windex and a Kim wipe to minimize ingestible lead contamination from your work surfaces. Do not eat or drink in soldering areas and wash hands after completing soldering work.

Use the following Personal Protective Equipment (PPE) to prevent inadvertent contact

Protective Clothing – To prevent burns from splashes of hot solder, long sleeve shirts and pants that are made of natural fibers (cotton) and closed-toe shoes should be worn. Heat resistant gloves may also be advisable.

Eye Protection – Safety glasses, goggles, or face shields should be used when soldering and clipping wires. Hold leads when cutting, so they do not fly away.

WARNING: Avoid inhalation of soldering smoke/fumes. The smoke formed during soldering is mostly from the flux. Inhalation of flux fumes during soldering may cause irritation and damage of mucous membranes and respiratory system. Eyes may become irritated from contact with smoke from soldering.

To reduce exposure:

Maintain fume extractors for maximum efficiency. Follow the manufacturer's recommendations for changing carbon filters and keep a maintenance record for each unit.

Conduct work in a well-ventilated area, use a bench top fume extractor or fan to ventilate fumes and smoke away from you.

Avoid breathing fumes/smoke by keeping your head to the side of, not above, your work.

4. Reduce Risk from Electricity

Soldering units should be UL (or equivalently) listed.

Use a soldering iron equipped with a grounding prong to reduce the risk of electrical damage if a short circuit occurs in the equipment.

A ground fault circuit interrupter (GFCI) should be used if contact with water is a potential. If the circuit isn't hardwired with a GFCI, a portable unit should be used.

Examine equipment for frayed or cracked cords or missing ground prong before each use. Immediately lock out any equipment that is not in good working order.

Prevent damage to electrical cords during soldering. Keep them away from heated tips. Grasp the plug, not the cord, when unplugging the unit.

5. Fire Prevention

Conduct work on a fire-proof or nonflammable surface.

Wear nonflammable (e.g. flame resistant lab coat) or 100% cotton clothing that covers your arms and legs to help prevent burns.

Be sure the iron is secure in its stand so it cannot inadvertently dislodge onto the work surface.

Know where the nearest fire extinguisher is located; only use this if you have been trained.

6. First Aid for Burns

Immediately cool the affected area under lukewarm water for 15 minutes.

Do not apply any creams or ointments on a burn. Cover with a Band-Aid.

Contact Campus Safety at 388-6911 if additional medical treatment is needed.

7. Hazard Communication Requirements

The following OSHA requirements must be implemented:

Safety Data Sheets- (SDSs) must be on file in the work area. Request these from your supplier if they were not provided at the time of purchase.

Training- Faculty and students who use solder that contains hazardous materials (e.g. lead, silver), must review these safety guidelines and sign the safety agreement, attached. It is recommended that all personnel using non-hazardous solder also review these guidelines.

8. Waste Management

Lead or silver soldering waste is considered hazardous. Discard lead or silver solder and dross in a container with a lid. Used lead or silver solder sponges and contaminated rags must be also be disposed of as hazardous waste. The waste collection container should be wide-mouth metal or glass. All other solder waste and dross may be disposed in regular trash containers.

The generator must inspect the hazardous waste containers weekly and ensure compliance with the following:

Storage – Store waste container(s) in a secure location, away from the work area.

Labeling -- The solder/dross container must be properly labeled as hazardous waste. Hazardous Waste labels will be provided by EHS. The label must include the hazardous chemical name printed neatly, with no abbreviations or chemical symbols.

Closure -- All hazardous waste solder/dross containers must be closed at all times except when adding waste.

Removal – When waste container is full, email EHS at address below for removal.

For any questions regarding this information, please contact Liz Dobson-Davis, EHS at x6340 or dobsonde@union.edu