

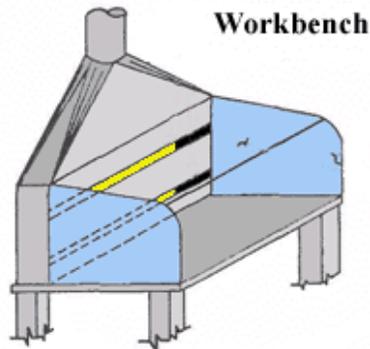
Lead Battery Manufacturing

Safety and Health
Topics Page

Maintenance

Maintenance personnel are at risk of exposure to lead fumes and dust during maintenance operations involving equipment that is contaminated with lead. Appropriate PPE should be provided and work practices should be followed when performing maintenance on this equipment. There are recommended engineering and work practice controls to minimize employee exposure in the following situations:

- [Maintaining or Moving Contaminated Equipment](#)
- [Working in Shops](#)
- [Preventive Maintenance Program](#)



[View larger image of workbench diagram](#)

Oxide and Grid
Processing

Plate Processing

Battery Assembly

Battery Repair and
Reclaim

Environmental
Controls

Maintenance

Engineering
Controls

OSHA Lead
Requirements...

Source
Identification
Protocol

Maintaining or Moving Contaminated Equipment

Potential Source of Exposure

- Maintenance shop personnel may be exposed to lead dust when servicing and handling equipment that is contaminated with lead.

Possible Engineering and Work Practice Controls

- Decontaminate equipment prior to servicing by vacuum, water spray, or mechanical removal such as scraping or brushing in conjunction with local exhaust ventilation.

[back to top](#)

Working in Shops

Potential Source of Exposure

- Exposure to lead may occur when working on contaminated equipment in the maintenance shop. (Figure 1)

Possible Engineering and Work Practice Controls

- Provide exhaust ventilation with HEPA filters.
 - ▶ [Moveable Exhaust Hood Diagram](#)
 - ▶ [Work Bench Diagram](#)
- Decontaminate equipment using vacuum, water spray, or mechanical



Figure 1
Maintenance shop

removal such as scraping or brushing in conjunction with local exhaust ventilation.

- Provide low volume and high velocity ventilated hand tools.

▶ [Typical System Low Volume/High Velocity Diagram](#)

▶ [Hood for Cup Type Surface Grinder and Wire Brushes](#)

- Provide Laminar Flow (Supplied Air) Islands at work stations.

▶ [Supplied Air Island Diagram](#)

- Provide wash-up sink for employees in the shop.

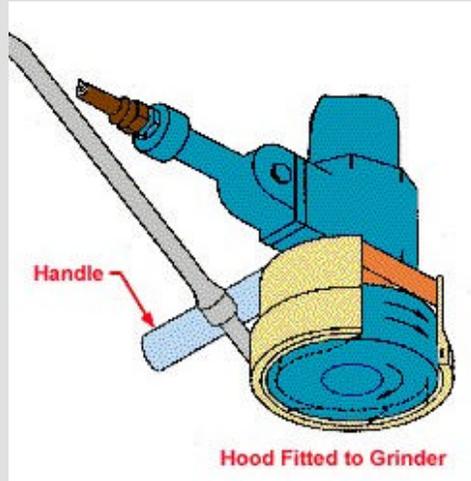
- Keep surfaces free of lead contamination as much as possible.

- Use local exhaust ventilation on torch.

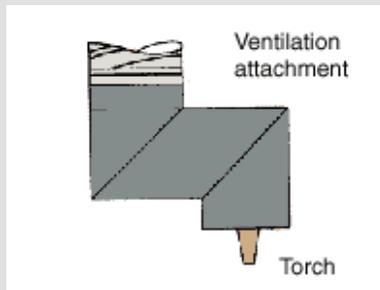
▶ [Post Burning Exhaust Diagram](#)

- Ensure that all shop vacuums are equipped with HEPA filters capable of removing lead.

- Empty vacuums in a manner that minimizes the reentry of lead into the shop.



[View larger image of surface grinder and wire brush hood diagram](#)



[View larger image of post burning exhaust diagram](#)

[back to top](#)

Preventive Maintenance Program

A well-designed system and a continuing preventive maintenance program are key in preventing and controlling ventilation system problems.

Elements of a Good Maintenance Program

- Establish a safe place to file drawings, specifications, fan curves, operating instructions, and other papers generated during design, construction, and testing.
- Establish a program of periodic inspection.
 - The types and frequencies of inspections depend on the operation of the system and other factors.
 - Daily: Visually inspect hoods, ductwork, access and clean-out doors, blast gate positions, hood static pressure, pressure drop across air cleaner, and verbally communicate with users ("How is the system performing today?").
 - Weekly: Check air cleaner capacity, fan housing, pulley belts.
 - Monthly: Check air cleaner components.

- See [Example Checklist](#).

A quick way to check for settled material in a duct is to take a broomstick and tap the underside of all the horizontal ducts. If the tapping produces a "clean" sheet metal sound, the duct is clear. If the tapping produces heavy, thudding sounds, there may be settled dust in the duct.

- Establish a preventive maintenance program.
 - Certain elements of any ventilation system should be checked on a regular schedule and replaced if found to be defective.
 - See [Example Checklist](#).
 - [OSHA Technical Manual: Ventilation Investigation](#). OSHA (1992), 26 pages. This manual describes the use of supply and exhaust ventilation to control emissions, exposures, and chemical hazards in the workplace.
- Provide worker training.
 - Workers need to be trained about the purpose and functions of the ventilation system. For example, they need to know how to work safely and how to best use the ventilation system. Exhaust hoods do little good if the welder does not know that the hood must be positioned close to the work.
- Keep written records.
 - Maintain written documentation, not only of original installations but also of all modifications as well as problems and resolutions.

[back to top](#)

| [Oxide and Grid Processing](#) | [Plate Processing](#) | [Battery Assembly](#) | [Battery Repair and Reclaim](#) |
| [Environmental Controls](#) | [Maintenance](#) | [Engineering Controls](#) | [OSHA Requirements](#) |

Lead Battery Manufacturing

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Topics Page

Maintenance > Checklist for Local Exhaust Ventilation System

The following checklist is provided as a guideline to assist with the materials needed and areas to check for an effective preventive maintenance program of ventilation systems in Battery Manufacturing plants.

Evaluation Equipment

Paper, pencil, recording devices
Smoke tubes, candles
Velometer
Pilot tube, manometer, hoses
Drill, bits
Tape measure
Flashlight
Ladder
Rags
Watch
RPM meter
Sound level meter
Volt/amp meter

Previously Recorded Data

Original design specifications and drawings
Original operating conditions
Modifications
Past inspection reports
Persons to contact
Maintenance schedule
Controls
Lockout provisions
Compliance inspections
Exposure monitoring records
Injury and illness history

Employee contact

Complaints
Suggestions
Observed work practices
Interaction with control
Interaction with emission source
Training
Use of personal protective equipment (PPE)

Ductwork

Physical integrity
Plugging and blockage
Transport velocities
Duct material
Changes since last inspection
Blast gate and damper settings

Air Cleaner

Physical integrity
Static pressure drop
Waste stream handling
Maintenance and operation
PM program followed

Fan

Direction of rotation
RPM
Pulleys, belts
Access doors
Fan wheel
Fan housing
Flexible coupling
Inlet/outlet
Stack weather head
Bearings
Vibration and noise
Fan SP/fan TP

Fan Motor

RPM
Rated HP
Amperage
Actual BHP
Drive train
Temperature
Weather protection

Oxide and Grid Processing

Plate Processing

Battery Assembly

Battery Repair and Reclaim

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Maintenance

Engineering Controls

OSHA Lead Requirements...

Source Identification Protocol

Cooperation

Vibration

Emission Source

Location of emissions
Rates of emission
Chemical characteristics
Physical characteristics
Employee exposure levels
Environment

Hood

Type (enclosure, receive, capture)
Capture velocity
Face velocity
Performance during normal operation
Performance during abnormal operation
Compatibility with work requirements
Physical integrity
competing air currents
Hood static pressure
Hood entry loss

Replacement Air

Same CFM as exhaust
Force on doors
Drafts at exterior walls
Inlets
Heat/cooling source
Distribution
Interference with capture velocity
Back-up system
Monitoring or warning system

Measurement and Calculations

Hood static pressure
Capture velocity
Face velocities
Duct diameters, lengths
Duct transport velocities
Temperature, pressure
Flow rates
Fan SP/fan TP
Fan RPM
Motor RPM
Motor amps
System static pressure

Checklist provided courtesy of Jeff Burton, as found in [Industrial Ventilation, A Self-Directed Learning Workbook](#), Checklist No. 8.

[Oxide and Grid Processing](#) | [Plate Processing](#) | [Battery Assembly](#) | [Battery Repair and Reclaim](#) |
[Environmental Controls](#) | [Maintenance](#) | [Engineering Controls](#) | [OSHA Requirements](#) |