

Helping to reduce your exposure to Lead during metal production and fabrication.

What is Lead?

Elemental lead is a soft and yet dense, silver-gray metal that is highly malleable with a melting point of 620°F (327°C) and a boiling point of 3164°F (1740°C).

Lead is relatively easy to extract from its naturally occurring ores and combined with its abundance and physical properties has proved useful to humans throughout history. In modern society, due to its known toxicity, uses and applications are limited.

Although relatively stable and unreactive, inorganic lead and lead compounds are used extensively throughout industry. Industrial processes may generate lead dust, fumes, or vapors which are hazardous to health.

Lead alkyls (organic lead) – used predominantly in the petrochemical industry – are not covered in this bulletin.

How can Lead affect me?

Workplace exposures to lead have been associated with a range of potential health effects—some can result from short-term acute exposures, others from long-term, repetitive, chronic exposures.

Did you know?

Metal workers, and particularly welders, are prone to developing pneumonia infections. There is a clear correlation between welders and increased risk of developing serious or fatal pneumonia infections.

Health and Safety Executive (HSE). Health risks from welding. <https://www.hse.gov.uk/welding/health-risks-welding.htm>

Potential acute health effects associated with metal production or fabrication

- Abdominal cramps and constipation
- Anorexia
- Myalgia (muscle pain)
- Non-specific lassitude (weariness)

Potential chronic health effects associated with metal production or fabrication

- Anemia
- Central Nervous System (CNS) damage
- Encephalopathy (altered mental state)
- Gastrointestinal problems
- High blood pressure
- Impaired neurological development, particularly in the very early stages of fetal development
- Kidney, liver, and lung diseases
- Male fertility issues
- Peripheral motor neuropathy (especially wrist drop)

Additional Information

- Lead and inorganic lead compounds are classified as probably carcinogenic to humans (Group 2A) by the International Agency for Research on Cancer (IARC), and confirmed animal carcinogen by the American Conference of Governmental Industrial Hygienists (ACGIH).

When do workplace exposures occur?

Inhalation

Often the primary route of lead exposure is through inhaling dust and fumes from the production and working of elemental lead and alloys. In metal fabrication the welding, grinding, cutting, drilling, and polishing of alloys that contain lead in significant exposure.

What is welding fume?

The majority of welding fume is filler material that is vaporized by the welding arc. The gaseous metal will react with oxygen in the air to form a metal oxide and will solidify to form tiny metal oxide particles, or fume. Some welding fume will originate from the metals being welded. Many filler materials will contain metals that are known to be toxic and that can have detrimental health effects if inhaled. The contents of the filler material and the amount of welding fume generated will vary by welding process.

Hot Work

Other high energy or “hot work” processes, including cutting, grinding, and even polishing metals can create particles of metal and metal oxides that can be inhaled.

Other industrial applications may create dusts, mists, or fumes of lead. For example, the handling or application of powdered or liquid chemicals which contain lead.

Dermal

The secondary route of exposure is through contact with the skin and eyes, particularly if lead is in a liquid form that can readily pass through or damage the skin.

Ingestion

Workers can be exposed by the accidental ingestion of lead, for example workers eating, drinking, smoking, or biting their nails when their hands are contaminated.

Industries / Applications where workplace exposures may occur

Examples of metal production and fabrication applications, as well as other industries and processes in which individuals may be exposed to lead compounds:

Metal production, metal fabrication and related applications

- Lead and other metal smelting, refining, alloying, and casting
- Working with metallic lead and alloys containing lead
- Recovering and recycling lead from scrap and waste

Note: high temperature lead work (temp. >932°F (500°C)) typically give rise to higher airborne concentrations of lead fume, compared to other processes which are more likely to generate lead dusts.

Other applications

- Removal, stripping, and burning of lead paint
- Hot cutting in demolition and dismantling operations
- Lead-acid battery manufacture, breaking, and recycling
- Some painting of building and spray-painting of vehicles
- Manufacturing and processing lead compounds and chemicals
- Manufacturing leaded glass
- Manufacturing and using pigments, colors, and ceramic glazes

Note: high temperature lead work (temp. >932°F (500°C)) typically give rise to higher airborne concentrations of lead fume, compared to other processes which are more likely to generate lead dusts.

Medical surveillance

Those who are, or are likely to be significantly exposed to lead, may be required by national, state regulations to undergo regular health checks and medical surveillance, including periodic monitoring of lead levels within their blood or urine.

National, state regulations typically define a “suspension level,” a concentration of lead in the blood or urine that must not be exceeded. If the “suspension level” is exceeded then the worker will need to be removed from work tasks that may result in further exposures, and an investigation leading to corrective actions implemented.

National, state regulations may also set an “action level,” a concentration of (metal) in the blood or urine which, if exceeded, may trigger the implementation of additional monitoring and control measures.

What can I do to help protect my workers?

Use appropriate controls

Employers need to conduct a risk assessment, including a determination of exposure levels compared to exposure limits to understand what control measures may be needed.

If required, controls from the hierarchy of controls should be implemented and their effectiveness measured. For example, local exhaust ventilation (LEV) can be a highly effective engineering control used in welding, grinding, and many other applications.

An important component of controlling lead exposures is to minimize ingestion by implementing good hygiene practices, for example washing, changing and shower facilities.

Get the equipment that you need

In addition to implementing other control measures, Personal Protective Equipment (PPE) such as Respiratory Protective Equipment (RPE) is commonly used to help reduce exposures and risks to workers.

Respiratory Protective Equipment (RPE) – air-purifying respirators

3M has a range of RPE that can help reduce your exposure to dusts, mists, metal fume, as well as gases and vapors commonly encountered in metal production and fabrication. These include disposable particulate respirators, reusable half- and full-facepiece respirators, and battery powered air-purifying respirators combined with a range of robust facepieces, headtops, and helmets.

Respiratory Protective Equipment (RPE) – supplied air respirators

3M also has a wide range of supplied air respirators, suitable for use in some of the most demanding work environments.

Welding shields with respiratory protections

3M also has a wide range of 3M™ Speedglas™ Welding shields that provide eye and face protection from harmful radiation, sparks, and spatter. All of these welding shields can be used with 3M disposable or reusable half-facepiece respirators. Alternatively, 3M has welding shields and helmets that are designed to work with 3M powered or supplied air systems that provide multiple types of protection in one product.

Eye and Face Protective Equipment

Whether it be a 3M™ Speedglas™ welding visor with an auto-darkening filter or a lightweight full face shield, 3M has a full range of PPE to help protect you from the many hazards encountered in welding and metal working.

Other PPE

3M can also provide a wide range of other safety solutions including:

- Head, eye, and face protection
- Disposable and reusable ear plugs and ear muffs
- Protective Communication solutions
- Disposable protective coveralls
- Fall protection
- Confined space solutions



[Find your respirator](#)

Use our interactive disposable respirator selector to help you find a respirator that meets your protection needs.



[Find your respirator](#)

Use our respirator selection guide to help you find a respirator that meets your protection needs.



[Find your respirator](#)

Use our interactive powered & supplied air respirator selector to help you find a respirator that meets your protection needs.

[View all 3M PPE Solutions](#)

Training

A key component of an effective PPE program is training for both workers and those responsible for health and safety in the workplace.

For example, workers wearing PPE should be trained in and understand:

- How PPE works, what it does, and its limitations
- Inspection, maintenance, and cleaning of the PPE as well as identifying damaged PPE and knowing proper disposal
- Proper fitting and use of the PPE
- The nature of all hazardous substances present and the potential effects upon their health

Stay Informed

When selecting the appropriate protective equipment, local, state, provincial, or national regulations, laws, and guidelines need to be followed.

One of the tasks of the occupational safety and health specialist is to monitor constantly changing legal regulations, occupational exposure limits, etc.

Technical Help

At any time, you can get in touch with one of our PPE professionals for personalized help on the selection and use of 3M products. They can help you through the process of selecting suitable products based on your risk assessment, as well as helping you understand how to fit, use, and maintain your PPE – helping you to stay protected.

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Safe Work Australia - Lead

<https://www.safeworkaustralia.gov.au/safety-topic/hazards/lead/overview>

All statements, technical information and recommendations are based on assessments 3M believes to be reliable as at the date of hereof, but the accuracy or completeness thereof is not guaranteed. Users must ensure suitability for your intended use of PPE based on workplace risk assessment, law and regulation. Other than for fraudulent misrepresentation, 3M expressly disclaims any and all liability arising from any use of the product or reliance on such information.



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