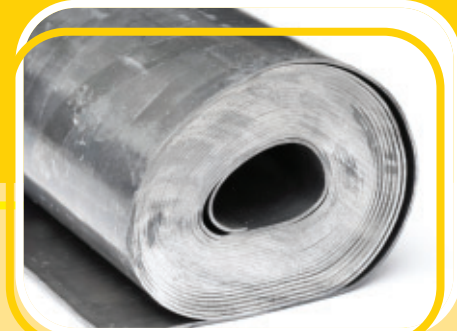


SAFETY WITH LEAD AT WORK

A guide for employers and employees



Our vision:

A country where worker safety, health and welfare and the safe management of chemicals are central to successful enterprise

Safety with Lead at Work Guide

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This guide provides general information on lead with regard to chemical health and safety issues for workers using or exposed to lead while they are at work.



As lead is used in many different work situations it is not possible to cover all scenarios in detail. Additional sources of information on lead are available and are listed in this document.

This publication has been prepared to provide basic guidance and is not intended as a legal interpretation of the legislation referred to herein.

What is lead?

Lead is a toxic heavy metal and it is found in many different products including rolled lead sheeting, paints, glass, solder, plastic and rubber compounds, therefore, workers can be exposed to lead in a variety of work activities.

Further detailed information is included in Appendix 2 relating to the use and risk of lead exposure in industry.

Potential health effects from exposure to lead

Lead exposure is one of the oldest known occupational hazards. The two routes of entry for lead in to the body are: inhalation of dusts or fumes containing lead and the ingestion (swallowing) of lead containing materials.

Lead is very toxic to the human body and prolonged or repeated exposure causes damage to the nervous system, kidneys, blood and it is suspected of causing cancer.

High levels of exposure over a short period of time can cause acute poisoning and symptoms of acute poisoning include a metallic taste in the mouth and vomiting, abdominal cramps, constipation and diarrhoea.

Long term exposure to lower doses causes chronic poisoning but symptoms of chronic poisoning are more difficult to spot as they are very similar to many other common complaints. Characteristic symptoms of chronic poisoning include a blue line in the gums and a 'drop wrist'. Severe abdominal pain and pallor may also be seen.

Children/young people are more susceptible than adults as they absorb greater amounts from the gastrointestinal tract. Lead is a cumulative toxin with 90% found in the bones. Lead is particularly toxic to children as lead exposure in children interferes with the development of the nervous system causing potentially permanent learning and behavioral disorders. Children/young people may suffer skeletal changes following chronic exposure.

Women of reproductive age are at a higher risk of damage from lead exposure because it can affect fertility, and increase the risk of stillbirths and miscarriages. As lead is a mutagen, it can also cause genetic defects. A pregnant employee must inform her employer at the earliest opportunity of her pregnancy to enable an adequate risk assessment to be conducted.

Also, if a worker brings lead contamination home, for example, on their work clothing, his or her partner and children are at a higher risk of health effects due to lead exposure.



Common work situations causing lead exposure

1. Working with solid lead sheet

When handling a clean solid lead sheet, the potential risk of exposure to lead is not considered to be significant. Significant lead exposure could occur if the work involves the stripping off of old existing sheets from a roof where the underside is corroded. Lead dust could be released and then inhaled. Suitable respiratory protection should be worn and good occupational hygiene practiced.

The melting down of lead for the caulking of sheet joints should be carried out at low temperatures below 500°C to prevent lead fumes being formed, which if inhaled may cause significant lead exposure to workers. Further detailed information on industry best practice for this type of work can be obtained from the UK Lead Sheet Association (www.leadsheet.co.uk)

2. Welding

If lead welding is carried out in a confined space with inadequate ventilation for lengthy periods of time, the risk of lead exposure could be significant. Most construction work on site is carried out for short periods of time in open air so the risk of lead exposure is normally low.

3. Work involving renovation, repair and painting (RRP)

Lead-based paints were widely available and used. Therefore, most old houses or buildings will contain some lead-based paint. In poorly maintained buildings the lead paint flakes and peels off and can then be inhaled. Uncontrolled or uncontained dust and debris from renovation works or repainting can expose the workers doing the work and occupants of the building to unsafe levels of lead.

Lead abatement projects are designed to permanently eliminate existing lead based hazards and prevent future lead exposure. But this work often involves high risk of worker exposure to lead unless the work is well planned and the workers protected with adequate respiratory protective equipment. An example of this would be the removal of lead-based paint from bridges.

Before starting this type of work, a **lead risk assessment** should be completed. Lead risk assessments are designed to identify the lead hazards and management strategies. Lead surveys are designed to locate all lead-based paint in the building. Lead surveys must always be carried out by a person who is competent to do the work. They should have adequate knowledge, training and expertise in understanding hazards and associated risks. They should know the work activities that uses and produces lead.

Workers must be trained and be competent to conduct lead-based paint activities. Workers must ensure that work areas are sealed off to prevent lead dust spreading and contaminating other workers or the building itself. Workers not directly involved with lead work, for example, scaffolders, can be exposed to lead from inhalation and ingestion of lead from contaminated scaffolding.

4. Recovery and recycling of scrap and waste

The UK Lead Sheet Association (www.leadsheet.org) have provided information for industry good practice for the recovery of old lead sheeting and off cut retrieval in the form of a simple code of practice to follow for construction and building work.



What protective measures should generally be taken when working with lead?

It is critical to avoid the inhalation of lead dust, fume or vapour or swallowing lead when a person eats, drinks, smokes or bite their nails without washing their hands or face first. Some general advice is provided below.

- Employees must be given **lead safety information and training** by their employer.
- All risks to lead workers must be considered in a **written risk assessment** before work starts. It must include arrangements to deal with accidents,

incidents and emergencies such as an uncontrolled release of lead dust or fume etc.

- Avoid allowing lead dust becoming airborne for example by using tools with suitable extraction. Employees must report any damaged equipment to their employer.
- The work area must be kept clean and ensure lead waste is removed at the end of the day.
- Make sure neighbouring workers are not contaminated by any work with lead.
- Eating and drinking should only to be carried out in designated areas that are free from lead contamination.
- Always have a good standard of personal hygiene-employees must wash their hands and face and scrub their nails before eating, drinking or smoking and always wash before going home.
- Never bring home lead contaminated clothes or equipment as it could contaminate the car, the home or family members with lead.
- Employees must always keep their medical appointments with the occupational doctor and report any ill health issues.

What personal protective equipment (PPE) should be used when working with lead?

The type of PPE used must be based on the written risk assessment but will generally include suitable respiratory protective equipment (RPE), barrier cream, gloves, eye protection, safety footwear and disposable overalls. The worker must be properly trained in the use maintenance and storage of ppe.

If tight fitting respirators are used, the employer must arrange for face-fit testing to ensure it correctly fits the worker. If disposable masks are used, the worker must be clean shaven and the employee must wear the mask properly otherwise the level of protection given will not be as good as expected.

Always seek professional advice from equipment suppliers as the use of incorrect respiratory equipment could mean exposure to lead at work. The use of powered air respiratory protection can give greater protection to the worker. The relevant respiratory protection for a situation requires individual evaluation of the work and relates to the concentration of lead that the worker may be exposed to.

Please consult the following 'A guide to Respiratory Protective Equipment' for more detailed guidance. Available at www.hsa.ie

What is the role of health surveillance?

Health surveillance is used to prevent occupationally related disease in workers. It allows adverse variations in their health, due to working conditions, to be identified as early as possible. It must be carried out by a doctor experienced in occupational medicine. Those workers starting in a job where they



will be working with lead on a regular basis should have a pre-employment medical examination.

The health surveillance programme allows the worker's health to be protected by:

- Determining the amount of lead going into the workers body through lead in blood monitoring.
- Allowing for remedial action to control lead absorption.
- Allowing for education of workers on the health effects of lead.

The amount of lead in the blood lead sample can be used to determine:

- When an employee should be suspended from lead exposure at work.
- When an urgent review of work practices and personal hygiene should be made.
- When further testing should take place.
- When a worker is safe to return to work after excessive lead exposure.

Detailed guidance on monitoring of an employee's blood- lead concentration, and intervals for blood-lead measurements for various categories are given in

Appendix 1.

It is the employer's legal duty to ensure that an occupational exposure limit value set out in a relevant code of practice shall not be exceeded when measured or calculated in relation to the reference period listed.

At present, as per the Safety, Health and Welfare (Chemical Agent) Regulations 2001, Schedule 1 states that the binding Occupational Exposure Limit for 8hrs (time weighted average) is $0.15\text{mg}/\text{m}^3$ for inorganic lead and its compounds (lead in air).

Health surveillance is carried out in accordance with the binding biological limit values and health

surveillance measures of Schedule 2 of the Safety, Health and Welfare (Chemical Agent) Regulations 2001.

For further information in relation to lead and health surveillance, please refer to the Health and Safety Authority's **Biological Monitoring Guidelines** available at www.hsa.ie.

Measuring worker exposure to lead

Lead can be measured in the workplace air or in the workers blood or urine. Total urinary lead concentration is used for measuring lead alkyls exposure in the body. Blood leads are usually used for other lead exposures.

Action must be taken to prevent exposure when:

- (a) Exposure exceeds half the occupational exposure limit for lead; or
- (b) There is a substantial risk of the employee ingesting lead; or
- (c) There is a risk of an employee's skin coming in contact with lead alkyls or any other substance containing lead in a form, e.g. lead naphthenate which can also be absorbed through the skin.

Examples of work where significant lead exposure may occur are provided in **Appendix 2** (Table 1).

Blood lead tests should be carried out in accordance with medical advice. The blood lead measurement gives an estimation of a workers current exposure to lead. Details of good practice can be found in **Appendix 1.**

The use of ZPP (zinc protoporphyrin) in blood monitoring gives an indication of the workers exposure to lead over a longer period of time. Blood lead testing allows the employer to determine the risk the worker faces from exposure to lead and that control measures put in place by the company are good enough to protect the workers.

Key points for employers

The employer must ensure a safe working environment where exposure to lead dust fume or vapour is prevented or controlled. The employer should have or provide the following:

- An up to date safety statement.
- A written risk assessment for all work activities involving lead.
- Adequate control measures for all exposure to lead scenarios.
- Information, instruction and training for employees.
- Making available an appropriate health surveillance programme.

Key points for employees

Employees are entitled to information about any hazards in the workplace and information contained in the employer's risk assessment. They are also entitled to information on protective and preventative measures taken.

Employees who are likely to work with lead need information, instruction and supervision so that they know and understand the following.

- The information on the safety data sheet for chemicals used in the workplace.
- Results of the risk assessment.
- Proper use of control measures including PPE.

- The need to report any failures in control measures.
- Health risks from exposure to lead and the importance of reporting ill health at an early stage.
- The role of health surveillance.

What legislation is applicable to work with lead?

The Safety, Health and Welfare at Work (General Application) Regulations, 2007, S.I No.299 of 2007. This legislation includes legal requirements concerning personal protective equipment and manual handling provisions as this would be a concern for some activities involving lead.



The Safety, Health and Welfare at Work (Chemical Agents) Regulations, 2001 S.I No. 619 of 2001. The requirements of this legislation apply where hazardous chemical agents are present in the workplace. These Regulations apply to an employer and the self-employed. A duty to provide a written risk assessment is required to be completed by the employer. There is a duty for an employer to make provision for appropriate health surveillance to be made available and under the responsibility of an occupational healthcare professional to those employees for whom a risk assessment specified under Regulation 4 reveals a risk to their safety and health (in this case from lead exposure).

Safety, Health and Welfare at Work (Construction) Regulations 2013. If the work being carried out falls under the definition of 'Construction Work' then these regulations apply. These regulations place duties on clients, designers and contractors when carrying out construction work. The regulations also place additional duties on the Client when there is a particular risk associated with the project e.g. working with lead. For guidance on the construction regulations please refer to the construction page on www.hsa.ie.

Safety, Health and Welfare at Work Act, 2005 (S.I No10 of 2005) applies to all work places and all work activities.

Further information

Information and guidance documents can be downloaded free of charge from the HSA publications webpage at www.hsa.ie including:

- A guide to Respiratory Protective Equipment
- Safety Data Sheets information sheet
- Your steps to chemical safety
- Biological Monitoring Guidelines
- Health and Safety Authority, Guidelines to the Safety, Health and Welfare at Work (Chemical Agents), Regulations, 2001
- Guide for Contractors and Project Supervisors for Safety, Health and Welfare at Work (Construction) Regulations 2013
- Construction safety page-(SSWP) the safe systems of work plans

Contact the Workplace Contact Unit telephone 1890 289 389 or the Chemicals Helpdesk by email chemicals@hsa.ie

Other useful sources of information on lead

Please note that non-Irish sources of information are provided below for general guidance on good practice only and that the legislation and standards referred to therein are not the legislation or standards which may be applicable in Ireland.

- <http://www.hse.gov.uk/lead/> (provides access to health and safety information relating to lead at work from the U.K).
- <http://portal.hud.gov/> (provides good working practice from US Department of Housing and Urban Development. Search under lead for access to information.

Appendix 1*Monitoring of an employee's blood- lead concentration - Intervals for blood-lead measurements for various categories**

CATEGORY	BLOOD-LEAD µg/dl	MAXIMUM INTERVAL BETWEEN BLOOD-LEAD MEASUREMENTS
A	Under 30	12 months (see note below)
B	≥30 and <40	6 months
C	≥40 and < 50	3 months
D	≥50 and <60	3 months
E	60 and over	At the doctor's discretion but not more than three months.

Notes:-

Category A- indicates that the absorption of lead due to occupational exposure is reasonably well controlled.

Category B- indicates lead is being absorbed due to occupational exposure to lead. Suitable biological tests including ZPP, erythrocyte protoporphyrins, aminolaevulinic acid dehydratase in blood (ALAD) and aminolaevulinic acid in urine (ALAU) may be carried out every 12 months.

Category C- also indicates lead is being absorbed due to occupational exposure but at a higher concentration than category B employees and be approaching the action level. Other suitable biological tests may be also appropriate as in Category B employees.

Category D- indicates that the blood-lead concentrations have breached the action level and the employer should carry out an investigation. The employee should come under direct medical surveillance in that a clinical assessment and any other relevant biological tests should be carried out as soon as possible after the blood-lead concentration has been confirmed.

Category E- represents the concentration at or above which the doctor may certify the employee as unfit for work where there is liable to be exposure to lead.

**Taken from Control of Lead at Work Regulations 2002 - Approved Code of Practice HSE BOOKS, UK .*

Appendix 2

Table 1

Types of work and workplaces with potential to result in significant exposure

Lead work where there is liable to be significant exposure to lead (unless the employer provides adequate controls).	Examples of industries and processes where such work could be carried out.
<p>Lead dust, fumes and vapours.</p> <p>High-temperature lead work (above 500°C) e.g. lead smelting, melting, refining, casting and recovery processes, lead burning, welding and cutting.</p>	<p>Lead smelting and refining; casting of certain non-ferrous metals, e.g. gun metal battery grids, leaded steels manufacture, scrap metal and wire-patenting processes, burning of lead coated and painted plant and surfaces in demolition work; ship-building, breaking and repairing; chemical industry; radiator repair.</p>
<p>Work with lead compounds which give rise to lead dust in air e.g. any work activity involving a wide variety of lead compounds.</p>	<ul style="list-style-type: none"> • Manufacture of lead-acid batteries, paints and colours, lead compounds, rubber products, fire assay, i.e. the use of lead oxides for the assay of precious metals by the process of cupellation; certain mixing and melting processes in the glass industry, certain colour preparations and glazing processes in the pottery industry. High-speed mixing and blending of plastics moulding powders containing lead stabilisers or colours. Work with low solubility lead compounds where poor working practices and standards of cleaning exist. • Battery breaking. • Manufacture of detonators (explosives industry).
<p>Abrasion of lead giving rise to lead dust in air, e.g. dry discing, grinding, and cutting by power tools.</p>	<ul style="list-style-type: none"> • Miscellaneous industries, e.g. motor vehicle body manufacture and repair of leaded car bodies. • Firing small firearms on indoor ranges. • Blast removal and burning of old lead paint.

Appendix 2

Table 1 continued

Lead work where there is liable to be significant exposure to lead (unless the employer provides adequate controls).	Examples of industries and processes where such work could be carried out.
Spraying of lead paint and lead compounds and low solubility lead compounds.	Painting bridges, buildings etc. with lead paint.
Work with low solubility inorganic lead compounds.	Work which is poorly controlled. This might be because of poor ventilation, housekeeping, personal hygiene or lack of proper welfare, eating drinking or smoking facilities.
Paint stripping.	Furniture and joinery restoration, e.g. removal of old lead paint from antique furniture, doors, window in frames etc. by immersion in a bath of caustic soda or dichloromethane, and scrapping off the residual sludge. May be followed by pressure washing and sanding.
Craft work.	Sculpture of bas relief in lead sheet.
Lead alkyls. Production of concentrated lead alkyls.	Lead alkyl manufacture.
Inspection, cleaning and maintenance work inside tanks which have tanks which have contained leaded gasoline e.g. road, rail and sea tankers and fixed storage tanks.	Oil refineries, oil transport terminals and certain works where tank cars are inspected or repaired.

Appendix 2

Table 2

Work with lead not liable to result in significant exposure

1 Work with galena (lead sulphide).	Mining and working of galena when its character or composition is not changed.
2 Low temperature melting of lead (below 500 °C). Such low temperatures control the fume but some care is still required in controlling any dust from the dross.	Plumbing; soldering.
3 Work with materials which contain less than 1% lead.	
4 Work with lead in emulsion or paste form where the moisture content is such and is maintained so that lead dust and fume cannot be given off throughout the duration of the work.	Brush painting with lead paint and using some stabilisers for plastics.
5 Handling of clean solid metallic lead e.g. ingots, pipes, sheets etc.	Miscellaneous metal industries, stock holding, general plumbing with lead sheet.
Lead alkyls: Any exposure to lead alkyl vapours from leaded gasoline where the lead content is limited by legislation.	Work with leaded gasoline including, for example the filling of petrol vehicles on garage forecourts (except for work inside tanks which have contained leaded gasoline).

Source: Tables taken from *Control of Lead at Work (third edition) Control of Lead at Work Regulations 2002 Approved Code of Practice and guidance*. HSE (UK)

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**HEALTH AND SAFETY
AUTHORITY**

Tel. 1890 289 389

International
Callers

00353 1 6147000

Fax. (01) 6147020

www.hsa.ie



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