

# Hazard awareness bulletin.

# Beryllium



## Helping to reduce your exposure to Beryllium during metal production and fabrication.

### What is Beryllium?

Beryllium is a white-grey lightweight metal with highly valued mechanical and thermal properties, that is used in both an elemental form in specialist applications and also in alloys.

Beryllium metal is used for lightweight structural components in the defence and aerospace industries due to its stiffness, weight and

thermal stability properties. Alloys with aluminium, iron, nickel and notably copper (beryllium copper alloys do not spark when impacted with steel) are common uses of beryllium.

Beryllium oxide (beryllia) is a hard, white ceramic material that is an electrical insulator with exceptionally high thermal conductivity and a high melting point, making it suitable as a specialist refractory material.

### How can Beryllium affect me?

Workplace exposures to beryllium can cause a range of detrimental health effects – some can result from short-term acute exposures, others from long-term, repetitive, chronic exposures. Irritation of the eyes, nose and throat.

#### Acute health effects from production or fabrication

- Eye and skin irritation
- Corn-like skin lesions from beryllium swarf contact
- ‘Acute beryllium disease’ – from short-term, large exposures
- Wheezing, shortness of breath, cough, fatigue
- Pneumonitis

#### Chronic health effects from metal production or fabrication

- Allergic dermatitis
- ‘Chronic Beryllium Disease, CBD’ (Berylliosis)
- Pneumoconiosis and pneumonitis
- Wheezing, shortness of breath, cough, fatigue
- Pulmonary fibrosis
- Lung and respiratory cancers

#### Health effects from other industries or compounds

- Eye and skin irritation from soluble beryllium salt contact

### Did you know?

Pneumoconiosis is the accumulation of dust in the lungs and the subsequent reaction to its presence. The term covers a wide range of different diseases and is derived from Greek, meaning “dusty lungs”.

Pneumoconioses are generally long-term and irreversible diseases characterised by inflammation (pneumonitis) and scarring (pulmonary fibrosis) of the lung tissue. However, in some cases, particularly silicosis, rapidly progressive forms can occur after only short periods of intense exposure.



## When do workplace exposures occur?

### Inhalation

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

### What is welding fume?

The majority of welding fume is filler wire material that is vapourised 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, of fume. Some welding fume will originate from the metals being welded.

Many filler wires will contain metals that are known to be toxic and that can have detrimental health effects if inhaled. The contents of the filler wire 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 readily inhaled.

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

### ▶ Dermal

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

### ▶ Ingestion

Workers can be exposed by the accidental ingestion of beryllium, 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 beryllium compounds:

### Metal production, metal fabrication and related

- Specialist alloys production, welding, grinding and machining, e.g. copper-beryllium alloys used in the aerospace and nuclear industries

### Other applications

- Neutron moderator for the nuclear industry
- X-ray generators and detectors
- Electrical control gear and switchgear  
Injection moulds coatings for durability
- Electronic equipment, including lasers and microwave device

### Did you know?

Metal workers, and particularly welders, are prone to developing pneumonia infections. These can normally be treated by antibiotics, but there is a clear correlation between welders and increased risk of developing serious or fatal pneumonia infections.

### Extra fact:

Workers are also at risk of exposure from inhaling mists of beryllium salts. Beryllium exposure is a particular issue through dermal exposure to soluble salts as well as metal dusts and swarf from working with beryllium metals and alloys.

### What can I do to protect myself?

#### 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.



## 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 required to reduce exposures and risks to workers.

### Respiratory Protective Equipment (RPE) – filtering respirators

From disposable particulate respirators, to reusable half- and full-face masks, through to heavy-duty battery powered air purifying respirators combined with a range of robust face masks, headtops and helmets; 3M has a range of RPE that can help reduce your exposure to dusts, mists, metal fume, ozone as well as other gases and vapours, commonly encountered in metal production and fabrication.

### Respiratory Protective Equipment (RPE) – supplied air respirators

3M also have a wide range of continuous and demand valve supplied air respirators, suitable for use in some of the most demanding working environments.

### Welding shields with respiratory protection

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

### Eye and Face Protective Equipment

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

### Other PPE

3M also can provide a wide range of other safety solutions you need to work safely, comfortably and effectively, including:

- Head, eye and face protection
- Disposable and reusable ear plugs, ear muffs
- Communication solutions
- Disposable and reusable protective coveralls
- Appropriate gloves for hand and skin protection
- Fall protection
- Confined space solutions
- Fixed and personal gas detection
- Fixed flame detection solutions

## Training

A key component of an effective PPE programme is a training concept for workers, those responsible for health and safety and employers in their roles and responsibilities.

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

- the nature of all hazardous substances present and the potential effects upon their health
- how PPE works, what it does and its limitations
- proper fitting and use of the PPE
- inspection, maintenance and cleaning of the PPE as well as identifying defective PPE and knowing how to deal with it

## Stay informed

When selecting the appropriate protective equipment, local or national regulations, laws and guidelines need to be complied with.

One of the tasks of the occupational safety and health department is to keep an eye on constantly changing legal regulations, occupational exposure limits, etc.

## Technical help

At any time, you can get in touch with one of our PPE experts for personalised help on the selection and use of 3M products. Their job is to help you through the process of selecting adequate and suitable products based on your risk assessment, as well as helping you understand how to fit, use and look after your PPE – helping you to stay healthy and safe so you can focus on what matters: doing your job properly and staying healthy for your loved ones and family.

## Medical surveillance

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

National regulations typically define a 'suspension level', a concentration of beryllium 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 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.

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