

Crystalline Silica

Hazard Awareness Bulletin
April 2023

Helping to reduce your exposure to Crystalline Silica during metal production and fabrication.

What is Crystalline Silica?

Crystalline silica (silicon dioxide, SiO₂) is one of the most common naturally occurring minerals on the earth. In the form of quartz, it is a basic component of many soils, sands, and rocks. Crystalline silica is used to make products such as mortar, concrete, brick, ceramics, dental fillings, jewelry, and artificial stone.

Respirable crystalline silica is created when cutting, sawing, grinding, drilling, and crushing stone, rock, concrete, brick, block, and mortar. Workplace exposures can occur during various activities, including manufacture and cutting of bricks, concrete blocks, and ceramic products.

In the metalworking industries exposures can occur during abrasive blasting, and during sand casting and investment casting foundry processes.

How can Crystalline Silica affect me?

Workplace exposures to respirable crystalline silica 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?

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 the Greek, meaning “dusty lungs”.

Pneumoconiosis are generally long-term and irreversible diseases characterized by inflammation (pneumonitis) and scarring (pulmonary fibrosis) of the lung tissue. However, in some cases, particularly silicosis, rapidly progressive forms can occur.

Potential acute health effects associated with metal production or fabrication

- Eye and respiratory tract irritation

Potential chronic health effects associated with metal production or fabrication

- Silicosis
- Lung cancer
- Chronic Obstructive Pulmonary Disease (COPD) Pulmonary Fibrosis
- Kidney disease

Did you know?

Chronic Obstructive Pulmonary Disease (COPD) is a serious long-term lung disease, which results in irreversible narrowing of the airways over time due, reducing the flow of air into the lungs, due to inflammation of the air passages and damage to the lung tissue.

In extreme cases, the reduced air flow to the lung is highly debilitating and can be fatal. Other symptoms include a persistent cough (>3 months of the year), wheezing and increased phlegm production.

COPD includes the conditions bronchitis and emphysema.

When do workplace exposures occur?

Inhalation

The primary route of respirable crystalline silica exposure is through inhaling dust from products containing crystalline silica. In metal fabrication, abrasive blasting and foundry operations using sands that contain crystalline silica can result in significant exposure.

Other industrial applications may create dusts containing respirable crystalline silica. For example, the cutting of concrete or production of artificial stone products.

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 crystalline silica:

Metal production, metal fabrication and related applications

- Abrasive blasting
- Sand Casting
- Investment Casting
- Primary metal production
- Refractory repair/replacement

Additional Information

Crystalline silica is classified as a Group 1 - Carcinogenic to humans by the International Agency for Research on Cancer (IARC), and as an A2 - Suspected human carcinogen by the American Conference of Governmental Industrial Hygienists (ACGIH).

Other applications

- Fracking
- Railroad maintenance
- Concrete cutting/chipping
- Ready mix concrete
- Pottery production

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.

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 heavy-duty 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.

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 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.

References

Smedley, et al: Smedley, J, Dick, F and Sadhra, S. Oxford Handbook of Occupational Health (second edition). 2013.

ACGIH TLVs: American Conference of Governmental Industrial Hygienists (ACGIH(R)). Threshold Limit Values for Chemical Substances and Physical Agents & Biological Exposure Indices (TLVs(R) and BEIs(R)). 2018

International Agency for Research on Cancer (IARC). Monographs on the Evaluation of Carcinogenic Risks to Humans - Volume 68 - Silica, Some Silicates, Coal Dust and para-Aramid Fibrils, 1997

Occupational Safety and Health Administration (OSHA), Safety and Health Topics / Silica, Crystalline, <https://www.osha.gov/silica-crystalline>

[Adapting Metalworking Safety Programs for the New Silica Standard](#), 3M Technical Bulletin, Release 1, June 2018

SafeWork Australia <https://www.safeworkaustralia.gov.au/safety-topic/hazards/crystalline-silica-and-silicosis>

WorkSafe NZ <https://www.worksafe.govt.nz/topic-and-industry/dust/silica-dust-in-the-workplace/>

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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