Kresco

WHY IS CRYSTALLINE SILICA EXPOSURE HAZARDOUS TO SANDBLASTING WORKERS?

What is Crystalline Silica?

Crystalline silica is a basic component of soil, sand, granite, and many other minerals. Quartz is the most common form of crystalline silica. Cristobalite and tridymite are two other forms of crystalline silica.

Where Can We Find Crystalline Silica?

Crystalline silica may become particles of respirable size in certain production processes dealing with materials and/or substrates containing that substance. These processes include grinding, chipping, cutting, and… abrasive blasting.

Some abrasive media can release a certain amount of free crystalline silica dust when they shatter upon contact with the workpiece. Some contaminants or coating materials on parts may also contain crystalline silica and/or other heavy metals, which could be harmful for human health.

Why is Crystalline Silica Hazardous to Operators?

Crystalline silica has been classified as a human lung carcinogen. Also, breathing crystalline silica may cause silicosis, which occurs when silica dust enters the lungs and causes the formation of scar tissue. Like many lung diseases, silicosis reduces the lungs' ability to supply oxygen to the human body. It also affects lung function, exposing humans to infections like tuberculosis. Unfortunately, silicosis is incurable and can lead to disability or, in worse cases, death.

According to studies, over two million American workers and 380,000 Canadians workers are exposed to silica at work. According to 2011 cancer statistics from the Occupational Cancer Research Centre (OCRC)'s Burden of Occupational Cancer Study, 570 lung cancer cases (2.4% overall) were attributed to occupational exposure to crystalline silica in Canada.

How Can You Determine If a Product Contains Hazardous Concentrations of Crystalline Silica?

Always consult your material safety data sheet (MSDS) to find the composition of your product, as well as the associated risks for your workers. Materials containing less than 1% free crystalline silica are not considered hazardous according to major safety organizations, but may still put your operators at risk when no safety measures are undertaken.

Occupational Safety and Health Administration (OSHA) has established the Permissible Exposure Limit (PEL), which is the maximum amount of crystalline silica to which workers may be exposed during an eight-hour work shift. This article can be found here: 29 CFR 1926.55, 1910.1000

How Can You Prevent Crystalline Silica Exposure?

- **Avoid using recycled glass** or other abrasive media containing high concentrations of free crystalline silica (above 1%). Not only do they produce significant amounts of hazardous crystalline silica dust, but they are also harmful for your blasting system because they cause premature wear on critical components such as valves, hoses, and nozzles.

- **Equip your system with the proper dust collection system** for your application. The dust collector will draft away dust and other fine particles at the source where it is produced, before it can escape into the work environment and contaminate the air your workers breathe. A regular maintenance schedule on the dust collection and ducting system is also necessary to ensure it is operating in optimal working condition.

- **If you are operating a sandblast cabinet, make sure it is equipped with a door-lock safety device.** This low-value, highly effective device will lock your door for a certain amount of time whenever blasting operations stop (i.e. 30 seconds) to make sure all dust is drafted away before the operator can open the door and breathe the air inside the cabinet. For some safety regulation bodies, including OSHA, such a safety device is mandatory in work environments within their jurisdiction.

- **If you are blasting in an open space, such as a blast booth or outdoors, always wear a proper air breathing and filtration system.** In fact, the use of an air breathing and filtration system is ALWAYS recommended when you are dealing with an application that produces dust. A breathing helmet connected to a proper air filtration system will ensure that your workers breathe clean air at all times.
- **Establish and maintain a sustainable training and information program** to make sure that all your workers are aware of the risks associated with crystalline silica exposure and the preventive measures that can be taken to protect them.
- **Check with your local safety jurisdiction** to find out more about the preventive measures and obligations which employers must follow if their workers are exposed to crystalline silica.

Obligations for Employers in Ontario

The Ministry of Labour in Ontario has issued a guideline to raise the awareness of employers and workers in the construction industry of the hazards posed by silica in construction and the measures and procedures that should be taken to control those hazards.

Below is an abstract of the safety measures and mandatory procedures that should be implemented into the workplace. Full Guideline can be found here:
Silica On Construction Projects.

Ontario

Ministry of Labour, Training
And Skills Development

General Measures

- → Clean-up after each operation is encouraged to prevent dust containing silica from spreading;
- → Compressed air or dry sweeping should be avoided when cleaning a work area;
- → Compressed air should not be used for removing dust from clothing;
- → Workers exposed to silica should be provided with or have access to washing facilities equipped with clean water, soap, and individual towels.

Obligations for Employers in Ontario (CONT'D)

- Silica dust on personal protective clothing and equipment should be removed by damp wiping or HEPA vacuuming;
- Contaminated personal protective clothing and equipment should be handled with care to prevent disturbing the silica dust and the generation of airborne silica dust
- Washing facilities and laundering procedures must be suitable for handling silica contaminated laundry.

Preparation of the Work Area

Warning signs should be posted in sufficient number to warn of the hazard. If it is an indoor operation, signs should be posted at each entrance to the work area. The signs should display the following information in large, clearly visible letters:

- There is a silica dust hazard.
- Access to the work area is restricted to authorized persons.
- Respirators must be worn in the work area.

Dust Control Measures

The generation of airborne silica-containing dust should be controlled with a mechanical ventilation system, wetting, or the use of a dust collection system. If silica-containing airborne dust is generated, mechanical ventilation with an air flow sufficient to remove airborne contaminants from workers' breathing zone should be provided. The air flow of the mechanical ventilation system should be at least 50 cubic feet per minute per square foot of face area (0.25 m3/s per square meter of face area). However, if it is determined that none of these methods are practical, workers may be provided with respirators (see Table 1: Respirator Requirements) to protect them from exposure. The following should be considered before assigning respirators:

- Risk to workers using wetting or a dust collection system.
- Likelihood of damage to equipment if wetting or a dust collection system is used.
- Frequency and duration of the operation.

If compressed air is being used to remove silica-containing dust outdoors, the operator and workers within 25 metres of the work area who may be exposed to the dust must either be removed from the path of the dust cloud or provided with respirators (see Table 1: Respirator Requirements). Where effective dust control measures are in place and where an employer can demonstrate on a continual basis that the silica exposure levels are below the OEL, respirators may not be required.

Obligations for Employers in Ontario (CONT'D)

Measures And Procedures For Type 3 Operations (Abrasive Blasting Operations)

The operator of the abrasive blasting nozzle should wear a Type CE abrasive blast supplied air respirator operated in a pressure demand or positive pressure mode with a tight-fitting half-mask or full facepiece.

It is recommended that compressed air that is used to supply supplied air respirators meet the breathing air purity requirements of CSA Standard Z180.1-00. (View CSA standards) Where an oil-lubricated compressor is used to supply breathing air, a continuous carbon monoxide monitor/alarm should be provided.

While abrasive blasting is in progress or the airborne dust from abrasive blasting is visible:

- any worker entering the work area where abrasive blasting is being carried out for less than 15 minutes for inspection and/or sampling purposes should wear a half-mask particulate respirator with N-, R-, or P-series filter and 95, 99 or 100 per cent efficiency.
- any worker entering a work area where abrasive blasting is being carried out for more than 15 minutes should wear a respirator with a NIOSH APF of 50 (see Table 1: Respirator Requirements).
- workers engaged in cleaning dust from abrasive blasting operations, should wear a respirator with a NIOSH APF of 50 (see Table 1: Respirator Requirements).

Where abrasive blasting is conducted, barriers, partial enclosures and full enclosures should be in place to prevent other workers from being exposed to silica-containing dust and to prevent the spread of dust to other work areas.

Kresco designs and manufactures custom abrasive blasting systems which systems which can help your company to comply with your local jurisdiction. For more information on the hazards of crystalline silica and what you can do to protect your workers, contact one of our experts today.

Sources:

Silica On Construction Projects, Ministry of Labour, Ontario, 2004
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Respirable Crystalline Silica: Breathe Easier, CCOHS, 2005,
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