



Safety

Silica Exposure Hazards: How to Protect Your Workers

Matt Morgan | Apr 18, 2024

A new rule curbing miners' exposure to breathable crystalline silica, which has been linked to black lung disease, has drawn heightened attention to procedures for protecting employees from the toxin in other workplaces—including metal fabrication businesses.

The reduction in permissible exposure to respirable crystalline silica in the mining industry, *approved* by the U.S. Department of Labor this week, matches the standards for construction (*29 CFR 1926.1153*) and general industry and maritime businesses (*29 CFR 1910.1053*), which were both introduced in 2016.

The policy details the steps employers must take when levels of respirable silica—particles small enough that they can be inhaled deeply into the lungs—become too high. It's scheduled to take effect in June, two months after publication in the Federal Register, with the exception of specific amendments.

Inhalation "can cause serious lung and other diseases, such as silicosis, lung cancer, progressive massive fibrosis, chronic bronchitis and kidney disease," the Department of Labor says in a *statement*.

Black lung disease, or coal workers' pneumoconiosis, is one form of fibrosis, or scarring of the lungs caused by small particles that severely lowers the ability to breathe.

Crystalline silica is naturally occurring, found in sand, stone, concrete and mortar. Respirable particles are created when cutting, sawing, grinding, drilling and crushing materials such as stone, rock, concrete, brick, block and mortar, the Occupational Safety and Health Administration says.

In metal fabrication facilities, breathable crystalline silica is produced during abrasive blasting (also known as sandblasting) to remove irregularities from workpieces such as foundry castings. Blasting is also used to peel paint from ship hulls, metal bridges and other metal surfaces.

Assessing Employee Exposure

According to *OSHA standards 1926.1153 and 1910.1053*, just like the new mining industry standard, an employee should not be exposed to more than 50 micrograms of respirable crystalline silica per cubic meter of air (50 µg/m³) in any eight-hour shift of a 40-hour workweek (8-hour TWA, or time-weighted

average).

Read more: *Silica Safety Checklist: Manage OSHA Table 1, PPE and More*

OSHA gives employers two ways to assess the 8-hour exposure to respirable crystalline silica:

Performance: This is based on “any combination of air monitoring data or objective data sufficient to accurately characterize employee exposures,” OSHA says. Objective data must closely reflect workplace conditions at the facility.

Scheduled monitoring: Initial monitoring for each employee is done using “personal breathing zone air samples that reflect the exposures of employees on each shift, for each job classification, in each work area,” which are sent to a qualified laboratory, OSHA says.

- If the initial sample is below 25 $\mu\text{g}/\text{m}^3$ (the “action level”), the employer can stop monitoring for that employee.
- If the initial sample is at or above the action level but below 50 $\mu\text{g}/\text{m}^3$, monitoring should be done again within six months. After two consecutive samples below the action level, the employer can stop monitoring for that employee.
- If the initial sample is at or above 50 $\mu\text{g}/\text{m}^3$, monitoring should be done again within three months.

According to the standard, employers must notify each employee within 15 working days of the exposure assessment.

Exposures should be reassessed whenever there is a change at the facility that might result in additional exposure or when workers have reason to believe there is additional exposure.

Complying with the Standard

First and foremost, where exposure to respirable crystalline silica may exceed the permissible exposure limit, employers must mark off a regulated area and minimize the number of employees who have access to it.

Next, following the National Institute for Occupational Safety and Health’s *hierarchy of controls*, employees must establish engineering and work practice controls to limit employee exposure to respirable crystalline silica. For construction, engineering controls are listed in **Table 1** of the standard (29 CFR 1926.1153).

Read more: *What Is the NIOSH Hierarchy of Controls, and How Can It Reduce Manufacturing Injuries?*

To comply with the standard, employers must also provide administrative controls, include information about respirable crystalline silica—and the measures that are in place to reduce that exposure—in their hazard communication plans and training programs.

Where these other controls are not enough to limit exposure to respirable crystalline silica in the workplace, OSHA requires employers to provide personal respirators to employees and anyone else entering the space. Respirators must comply with OSHA’s Respiratory Protection Standard (**29 CFR 1910.134**).

“The effectiveness of respirators is dependent on a proper fit, which requires initial and refresher training, along with practice,” the National Coalition of Black Lung and Respiratory Disease Clinics told the mine safety agency when it asked for input on the proposed rule. “Respirable dust particles are not visible to the unaided human eye, are odorless, and may provide no other information to the miner that

they are inhaling high concentrations of them. An ineffective respirator may then provide a false sense of security that the miner is protected from a dusty environment.”

Providing Medical Surveillance

As part of the standard, employers are required to make OSHA-compliant medical surveillance available at no cost to employees who are exposed to respirable crystalline silica at or above 25 $\mu\text{g}/\text{m}^3$ for 30 or more days per year.

The initial examination by a licensed health care professional will include a review of personal medical history, a physical exam, a chest X-ray, a lung-function test and a tuberculosis test. The employer must make future exams available every three years or more often as directed by the health care provider.

Medical records and air quality data must be kept for 30 years, in accordance with **29 CFR 1910.1020**.

By understanding the hazards of respirable crystalline silica exposure, adhering to safety standards, implementing effective controls and providing appropriate PPE, employers can make work environments safer and healthier.

If your facility has respirable crystalline silica, what are your tips for OSHA compliance? Let us know in the comments below.

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