

OSHA's Respirable Crystalline Silica Standard for Construction

By: Savita Trivedi, CIH



Source: osha.gov

Crystalline silica is a common mineral found in many naturally occurring and man-made materials. Materials like sand, concrete, brick, block, stone and mortar contain crystalline silica. The presence of these materials is not what poses the hazard. The hazard is created when high-energy activities such as cutting, grinding, drilling, and crushing of these silica-containing materials are conducted. These activities create very small dust particles known as “respirable” particles which can get lodged into a worker’s lungs.

When workers inhale high levels of respirable crystalline silica, the lung tissue reacts by developing fibrotic nodules and scarring around the trapped silica particles. This condition of the lung is referred to as silicosis. In the early stages of silicosis, there may be no symptoms. As the disease progresses, symptoms such as coughing, shortness of breath and weakness may occur. Silicosis is an incurable lung disease which can eventually lead to disability or even death. Exposure to respirable crystalline silica can also lead to lung cancer, chronic obstructive pulmonary disease, and kidney disease. The higher the levels of silica employees are exposed to and the longer the duration of exposure, the greater the risk of developing these diseases.

Exposure to respirable crystalline silica can occur during common construction tasks such as cutting brick, cutting concrete block, grinding mortar, operating floor grinders, drilling into concrete walls, conducting drywall finishing tasks, and using heavy equipment for demolition or for grading and excavating. It is estimated that about two million construction workers are exposed to respirable crystalline silica in over 600,000 workplaces.

In 2016, OSHA issued two new standards for Respirable Crystalline Silica; one for general industry and maritime (29 CFR 1910.1053), and one for construction (29 CFR 1926.1153). The 2016 standards established an action level for respirable crystalline silica at 25 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) and a permissible exposure limit at 50 $\mu\text{g}/\text{m}^3$, both calculated as 8-hour time-weighted averages. The standards also required employers to take additional steps to protect workers from silica hazards.

On February 4, 2020, OSHA published a National Emphasis Program (NEP) to reduce worker exposures to respirable crystalline silica in general industry, maritime, and construction. The NEP will target industries expected to have high exposures to silica and will focus on enforcement of the new Respirable Crystalline Silica standards. OSHA anticipates that the majority of the inspections will occur in construction because that is where most of the exposures are seen. The following is a review of the Respirable Crystalline Silica Standard for Construction.

Requirements of the Standard

The standard requires employers to limit worker exposures to respirable crystalline silica by first identifying tasks that employees perform that could expose them to respirable crystalline silica dust and then determining and implementing control measures to reduce exposures to silica during those tasks.

The standard provides employers with two options: employers can either use a “Specified Exposure Control Method” laid out in **Table 1** of the standard for common construction tasks or they can use an “Alternative Exposure Control Method” and independently decide which dust control methods work best to limit exposures to silica. If the second option is selected, an assessment of employee exposure to silica is required.

Regardless of which exposure control method is used, all employers covered under the standard are required to establish and implement an exposure control plan, designate a competent person to implement the plan, avoid certain housekeeping practices that expose workers to silica, and train workers on the health effects of silica and ways to limit their exposures. Employers are also required to offer medical exams to employees who are required by the standard to wear a respirator for 30 or more days per year.

Table I - Specified Exposure Control Methods

Table I of OSHA’s Respirable Crystalline Silica Standard matches 18 common construction tasks with dust control methods known to be effective in limiting worker exposures to silica. The control methods primarily entail either the use of a water delivery system to keep dust levels down or the use of a vacuum dust collection system to capture dust at the point of generation. In some cases an isolation method is required. OSHA has reviewed the control measures specified in Table 1 and found that they

are effective at limiting employee exposures to acceptable limits most of the time. For the few tasks where those control measures cannot limit employee exposures to acceptable limits, Table 1 requires the use of respiratory protection.

Employers that *fully and properly* implement the specified exposure controls methods of Table 1 do not have to conduct exposure assessments for employees engaged in those tasks, and are not subject to the Permissible Exposure Limit (PEL) for respirable crystalline silica.

Example of Table 1 Entry

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum APF	
		≤ 4 hr/shift	> 4 hr/shift
Stationary masonry saws	Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None

List of Table 1 Entries

- Stationary masonry saws
- Handheld power saws
- Handheld power saws for fiber cement board
- Walk-behind saws
- Drivable saws
- Rig-mounted core saws or drills
- Handheld and stand-mounted drills
- Dowel drilling rigs for concrete
- Vehicle-mounted drilling rigs for rock and concrete
- Jackhammers and handheld powered chipping tools
- Handheld grinders for mortar removal (tuckpointing)
- Handheld grinders for other than mortar removal
- Walk-behind milling machines and floor grinders
- Small drivable milling machines
- Large drivable milling machines
- Crushing machines
- Heavy equipment and utility vehicles to abrade or fracture silica materials
- Heavy equipment and utility vehicles for grading and excavating

Alternative Exposure Control Methods & Exposure Assessments

For tasks that are not listed in Table I, or where the engineering controls, work practices, and respiratory protection described in Table I are not fully and properly implemented, alternative exposure control methods must be used.

Employers that use alternative exposure control methods must conduct exposure assessments for employees engaged in those tasks, and are subject to the PEL for respirable crystalline silica.

For these tasks, engineering and work practice controls must be used to reduce and maintain employee exposures to respirable crystalline silica to or below the PEL. Where feasible controls are not sufficient to reduce employee exposure to or below the PEL, the employer must use the controls to reduce exposures to the lowest feasible level, and supplement the controls with the use of respiratory protection. The required exposure assessments can be done using either the monitoring option (initial and periodic personal exposure monitoring) or the performance option using air monitoring or objective data to characterize employee exposures to respirable crystalline silica.

Written Silica Exposure Control Plan

Employers must establish and implement a written silica exposure control plan. The plan must include at least the following:

- A description of the tasks in the workplace that involve exposure to respirable crystalline silica;
- A description of the engineering controls, work practices, and respiratory protection used to limit employee exposure to respirable crystalline silica for each task;
- A description of the housekeeping measures used to limit employee exposure to respirable crystalline silica; and
- A description of the procedures used to restrict access to work area where high exposures may occur.
- This plan must be reviewed and evaluated annually.

Competent Person

Employers must designate a competent person to make frequent and regular inspections of job sites, materials, and equipment. The competent person should be able to identify existing and foreseeable respirable crystalline silica hazards; be authorized to take prompt corrective measures to eliminate or minimize those hazards; and have the knowledge and ability to implement the written silica exposure control plan.

Housekeeping Practices

Employers must restrict housekeeping practices that expose workers to silica. When cleaning up dust that could contribute to employee exposure to respirable crystalline silica, employers must:

- Not allow dry brushing or dry sweeping, unless methods such as wet sweeping and HEPA-filtered vacuuming are not feasible;
- Not allow cleaning of surfaces or clothing with compressed air, unless the compressed air is used together with a ventilation system that effectively captures the dust cloud or no other cleaning method is feasible.

Fatality & Casualty Reporting

State & Town: Report to CONN-OSHA at (860) 263-6946 (local) or 1-866-241-4060 (toll-free)
Private Employers: Report to Federal OSHA at 1-800-321-OSHA (6742)

Cleaning methods such as wet sweeping and HEPA-filtered vacuuming, which prevent silica-containing dust from getting into the air, must be used whenever feasible. The proper use of a commercially-available dust-suppression sweeping compound, used in accordance with the manufacturer's instructions, is considered an acceptable housekeeping method under the standard.



A worker cutting a concrete block with a rotary hammer equipped block using a handheld masonry saw with dust collection system with an integrated water delivery system. Source: osha.gov

Medical Surveillance

Employers must make medical surveillance available at no cost and at a reasonable time and place to any employee who is required by the silica standard to use a respirator for 30 or more days a year. If an employee is required to wear a respirator for any amount of time during a day, it is counted as one day of respirator use. Medical examinations:

- Must be offered within the first 30 days of being assigned work covered by the standard; and
- Every three years thereafter if employee is still required to wear a respirator for 30 or more days/year.

The medical exam must include a medical and work history, a physical examination, a chest x-ray, a pulmonary function test, a test for latent tuberculosis infection (initial exam only), and any other tests deemed appropriate by the physician or other licensed health care professional (PLHCP).

Respiratory Protection

Employers must provide respirators to employees engaged in Table 1 tasks requiring the use of respiratory protection.

Employers must also provide respirators to employees who follow alternative exposure control methods where employee exposures exceed the PEL, and engineering and work practice controls have not yet been implemented, are not feasible, or are not sufficient enough to reduce exposures to below the PEL.

Where respiratory protection is required, employers must provide an appropriate NIOSH-approved respirator that complies with the requirements of the OSHA Respirable Crystalline Silica Standard and the Respiratory Protection Standard. Employers must also develop a written respiratory protection program in accordance with 29 CFR 1910.134. Employees required to wear a respirator must be medically cleared, trained, and fit-tested on the respirator used.

Training

Employers must train and inform employees about the health hazards associated with exposure to respirable crystalline silica and the control measures to limit exposures. Employees should be able demonstrate knowledge of the following:

- The health hazards associated with exposure to respirable crystalline silica;
- Specific tasks in the workplace that could result in exposure to respirable crystalline silica;
- Specific measures the employer has implemented to protect employees from exposure to respirable crystalline silica, including engineering controls, work practices, and respirators to be used;
- The contents of the Respirable Crystalline Silica Standard for Construction;
- The identity of the competent person designated by the employer; and
- The purpose and description of the medical surveillance program.

For example: Employees who operate a tool with a built-in control, such as a saw with an integrated water delivery system, should be able to demonstrate knowledge of how to fully and properly implement the control for the task. They should also be able to recognize signs that the control is not functioning properly.

Recordkeeping

Employers must maintain records of exposure assessments for respirable crystalline silica and records of medical surveillance.

National Emphasis Program

On February 4, 2020, OSHA published a National Emphasis Program (NEP) in response to findings that occupational exposures to silica continue to pose a significant risk to a large population of workers, and that there is a high rate of noncompliance (i.e., employee overexposures) to the standard. According to the NEP, over the first year after OSHA began enforcing the new PEL for silica, the Agency's air sampling data showed that 17.6 percent of silica samples exceeded the new PEL.

The goal of this NEP is to reduce or eliminate worker exposures to respirable crystalline silica in general industry, maritime, and construction. The NEP targets specific industries that are expected to have the highest exposures to silica. It will focus on enforcement of the silica standard for general industry and maritime, 29 CFR 1910.1053, as well as the silica standard for construction, 29 CFR 1926.1153.

For more information, visit the Crystalline Silica page on OSHA's website, www.osha.gov/silica, or request a free consultation from CONN-OSHA's Private Sector Program Manager, Anne Bracker at 860-263-6920.

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Hazard Corner

Engineered Stone Fabrication Workers Die from Silicosis

By: Robert Hunt

Workers who cut and polish engineered stone are exposed to high levels of silica dust. In recent years, engineered stone countertops have become very popular, estimated to have increased 800% between 2010 and 2018. The concern with engineered stone is that it contains substantially more silica than natural stone does, about 90% with engineered stone and about 45% with a stone like granite.

In a recent Morbidity and Mortality Weekly Report from the Centers for Disease Control and Prevention there was an article published about several engineered stone fabrication workers that were afflicted with silicosis. All of them worked at the same company.

In January 2019, the California Department of Public Health identified, through review of hospital discharge data for silicosis diagnoses, a Hispanic man aged 37 years who was hospitalized in 2017. He worked at a stone countertop fabrication company during 2004–2013, mainly with engineered stone. His work tasks included polishing slabs and dry-cutting and grinding stone edges. Workplace measurements during a California Division of Occupational Safety and Health inspection in 2009 showed respirable crystalline silica levels up to 22 times higher than the permissible exposure limit (PEL) of 0.1 mg/m³ in effect in California at that time. After developing respiratory symptoms in 2012, he had a chest computed tomography (CT) scan, which revealed findings of silicosis. Pulmonary function testing showed restrictive defects with reduced diffusion capacity; surgical lung biopsy showed mixed dust pneumoconiosis with polarizable particles consistent with silica. He died from silicosis in 2018 at age 38 years.

Further investigation of the patient's place of employment, in collaboration with the California Division of Occupational Safety and Health, identified additional silicosis cases among stone fabricators. The first patient was a Hispanic man who worked at the company during 2003–2016 and died in 2018 at age 36 years. After his death, investigators obtained lung tissue from autopsy, which showed silicotic nodules and alveolar proteinosis (indicating accelerated silicosis). Another case occurred in a Hispanic man aged 36 years who had worked at the company for 11 years and received a silicosis diagnosis in 2018. Since initiation of this investigation, three additional employees of the stone fabrication company, all Hispanic men aged 35–59 years, have screened positive for silicosis by chest radiograph, with diagnoses subsequently confirmed by chest CT.

Article summarized from: Rose C, Heinzerling A, Patel K, et al. Severe Silicosis in Engineered Stone Fabrication Workers — California, Colorado, Texas, and Washington, 2017–2019. *MMWR Morb Mortal Wkly Rep* 2019;68:813–818. DOI: http://dx.doi.org/10.15585/mmwr.mm6838a1external_icon



Source: osha.gov

CONN-OSHA Training Update...

Due to the current situation created by Corona-virus (COVID-19) several CONN-OSHA training classes have been cancelled but are in the process of being rescheduled. We are also working on providing training virtually. Watch our web site for upcoming event status.

Breakfast Roundtable This discussion group meets the third Tuesday of every month from 8:15 am to 9:45 am. Pre-registration is required. Visit our web page for more information: <http://www.ctdol.state.ct.us/osha/Breakfast/index.htm> To be placed on the e-mail distribution list, contact John Able at John.able@ct.gov.

Classes are free and are held at 200 Folly Brook Boulevard, Wethersfield, CT in Conference Room A/B (unless otherwise noted). To register, contact Catherine Zinsser at catherine.zinsser@ct.gov Pre-registration is required. A Photo I.D. is also required to allow entry into a public building. For more training information, visit the CONN-OSHA web site www.ConnOsha.com