

Workers' Exposure to Respirable Crystalline Silica: Final Rule Overview

More than 2 million workers gain protections from deadly dust

Background

Workplace illness takes the lives of thousands of workers each year. Those workers and their families rely on the U.S. Department of Labor's Occupational Safety and Health Administration to set and enforce standards that reduce the risk to those workers of contracting illnesses or suffering injuries on the job, so that no worker is forced to sacrifice their life or health for their livelihood. Respirable crystalline silica is particularly hazardous for the nation's workers.

Workers who inhale very small crystalline silica particles are at increased risk of developing serious — and often deadly — silica-related diseases. These tiny particles (known as “respirable” particles) can penetrate deep into workers' lungs and cause silicosis, an incurable and sometimes fatal lung disease. Crystalline silica exposure also puts workers at risk for developing lung cancer, other potentially debilitating respiratory diseases such as chronic obstructive pulmonary disease, and kidney disease. Approximately 2.3 million people in the U.S. are exposed to silica at work.

To better protect workers from dangerous crystalline silica, OSHA has finalized two new silica standards: one for general industry and maritime, and the other for construction. These rules are based on extensive review of peer-reviewed scientific evidence, current industry consensus standards, an extensive public outreach effort, and nearly a year of public comment, including several weeks of public hearings. They provide commonsense, affordable and flexible strategies for employers to protect workers in their workplaces from the serious risks posed by silica exposure.

OSHA estimates these standards will save the lives of more than 600 workers each year and prevent more than 900 cases of silicosis each year once the full effects of the rule are realized.

What is crystalline silica?

Crystalline silica is a common mineral that is found in materials that we see every day in roads, buildings, and sidewalks. It is a common component of sand, stone, rock, concrete, brick, block, and mortar.

- Exposures to crystalline silica dust occur in common workplace operations involving cutting, sawing, drilling, and crushing of concrete, brick, block, rock, and stone products (such as construction tasks), and operations using sand products (such as in glass manufacturing, foundries, sand blasting, and hydraulic fracturing).

Why do we need new silica standards?

- We have known about the dangers of silica for decades. More than 80 years ago, U.S. Secretary of Labor Frances Perkins first brought experts and stakeholders together to determine the best ways to protect workers from silica.
- OSHA's current permissible exposure limits for silica are more than 40 years old. They are based on research from the 1960s and earlier that do not reflect more recent scientific evidence.
- Strong evidence shows that the current exposure limits do not adequately protect worker health. For example, since the current exposure limits were adopted, respirable crystalline silica exposure has been found to cause lung cancer and kidney disease at the levels currently permitted.
- Many employers are already implementing the necessary measures to protect their workers from silica exposure. The technology for most employers to meet the new standards is widely available and affordable.

How will the rule protect workers?

- The rule significantly reduces the amount of silica dust that workers can be exposed to on the job. That means that employers will have

to implement controls and work practices that reduce workers' exposure to silica dust. For most activities, that means that employers will have to ensure that silica dust is wetted down or vacuumed up before workers can breathe it in.

- Employers are required under the rule to limit access to high exposure areas, provide training, provide respiratory protection when controls are not enough to limit exposure, provide written exposure control plans, and measure exposures in some cases. Employers are also required to offer medical examinations to highly exposed workers. Workers who find out they have an illness, such as lung disease, can use that information to make employment or lifestyle decisions to protect their health.

How will OSHA help employers comply with the rule to protect their workers?

- The rule provides flexibility to help employers — especially small businesses — protect workers from silica exposure, with staggered compliance dates to ensure sufficient time to meet the requirements. Employers have from one to five years to get the right protections in place.
- The rule includes special flexibility for the construction industry. For the most common tasks in construction, OSHA has spelled out exactly how to best protect workers. If employers follow those specifications, they can be sure that they are providing their workers with the required level of protection. If they have better ideas about how to provide protection, they can do that too — as long as they make sure that their methods effectively reduce their workers' exposure to silica dust.

What industries are affected?

Affected industries include:

- Construction
- Glass manufacturing
- Pottery products
- Structural clay products

- Concrete products
- Foundries
- Dental laboratories
- Paintings and coatings
- Jewelry production
- Refractory products
- Ready-mix concrete
- Cut stone and stone products
- Abrasive blasting in maritime, construction, and general industry
- Refractory furnace installation and repair
- Railroad transportation
- Oil and gas operations

Additional information

Additional information on OSHA's silica rule can be found at www.osha.gov/silica.

OSHA can provide extensive help through a variety of programs, including technical assistance about effective safety and health programs, workplace consultations, and training and education.

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U.S. Department of Labor

OSHA's Crystalline Silica Rule: Construction

OSHA is issuing two standards to protect workers from exposure to respirable crystalline silica—one for construction, and the other for general industry and maritime—in order to allow employers to tailor solutions to the specific conditions in their workplaces.

Who is affected by the construction standard?

About two million construction workers are exposed to respirable crystalline silica in over 600,000 workplaces. OSHA estimates that more than 840,000 of these workers are exposed to silica levels that exceed the new permissible exposure limit (PEL).

Exposure to respirable crystalline silica can cause silicosis, lung cancer, other respiratory diseases, and kidney disease. Exposure can occur during common construction tasks such as using masonry saws, grinders, drills, jackhammers and handheld powered chipping tools; operating vehicle-mounted drilling rigs; milling; operating crushing machines; and using heavy equipment for demolition or certain other tasks.



Photo: NIOSH

Without dust controls, using a handheld power saw to cut concrete can expose workers to high levels of respirable crystalline silica.

The construction standard does not apply where exposures will remain low under any foreseeable conditions; for example, when only performing tasks such as mixing mortar; pouring concrete footers, slab foundation and foundation walls; and removing concrete formwork.

What does the standard require?

The standard requires employers to limit worker exposures to respirable crystalline silica and to take other steps to protect workers.

The standard provides flexible alternatives, especially useful for small employers. Employers can either use a control method laid out in **Table 1** of the construction standard, or they can measure workers' exposure to silica and independently decide which dust controls work best to limit exposures to the PEL in their workplaces.

Regardless of which exposure control method is used, all construction employers covered by the standard are required to:

- Establish and implement a **written exposure control plan** that identifies tasks that involve exposure and methods used to protect workers, including procedures to restrict access to work areas where high exposures may occur.
- Designate a **competent** person to implement the written exposure control plan.
- Restrict **housekeeping** practices that expose workers to silica where feasible alternatives are available.
- Offer **medical exams** – including chest X-rays and lung function tests – every three years for workers who are required by the standard to wear a respirator for 30 or more days per year.

- **Train workers** on work operations that result in silica exposure and ways to limit exposure.
- **Keep records** of workers' silica exposure and medical exams.

What is Table 1?

Table 1 matches common construction tasks with dust control methods, so employers know exactly what they need to do to limit worker exposures to silica. The dust control measures listed in the table include methods known to be effective, like using water to keep dust from getting into the air or using ventilation to capture dust. In some operations, respirators may also be needed.

Employers who follow Table 1 correctly are not required to measure workers' exposure to silica and are not subject to the PEL.

Table 1 Example: Handheld Power Saws

If workers are sawing silica-containing materials, they can use a saw with a built-in system that applies water to the saw blade. The water limits the amount of respirable crystalline silica that gets into the air.

Table 1: Specified Exposure Control Methods When Working with Materials Containing Crystalline Silica			
Equipment/ Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hrs/ shift	> 4 hrs/ shift
Handheld power saws (any blade diameter)	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. <ul style="list-style-type: none"> • When used outdoors. • When used indoors or in an enclosed area. 	None	APF 10
		APF 10	APF 10

In this example, if a worker uses the saw outdoors for four hours or less per day, no respirator would be needed. If a worker uses the saw for more than four hours per day or any time indoors, he or she would need to use a respirator with an assigned protection factor (APF) of at least 10. In this case, a NIOSH-certified filtering facepiece respirator that covers the nose and mouth (sometimes referred to as a dust mask) could be used. If a worker needs to use a respirator on 30 or more days a year, he or she would need to be offered a medical exam.

Alternative exposure control methods

Employers who do not use control methods on Table 1 must:

- Measure the amount of silica that workers are exposed to if it may be at or above an **action level of 25 µg/m³** (micrograms of silica per cubic meter of air), averaged over an eight-hour day.
- Protect workers from respirable crystalline silica exposures above the **permissible exposure limit of 50 µg/m³**, averaged over an eight-hour day.
- Use **dust controls** to protect workers from silica exposures above the PEL.
- Provide **respirators** to workers when dust controls cannot limit exposures to the PEL.

When are employers required to comply with the standard?

Construction employers must comply with all requirements of the standard by June 23, 2017, except requirements for laboratory evaluation of exposure samples, which begin on June 23, 2018.

Additional information

Additional information on OSHA's silica rule can be found at www.osha.gov/silica.

OSHA can provide extensive help through a variety of programs, including technical assistance about effective safety and health programs, workplace consultations, and training and education.

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workplace hazards, provide advice on compliance with OSHA standards, and assist in establishing and improving safety and health management systems. To locate the OSHA On-site Consultation Program nearest you, call 1-800-321-OSHA (6742) or visit www.osha.gov/dcsp/smallbusiness.

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OSHA's Crystalline Silica Rule: General Industry and Maritime

OSHA is issuing two standards to protect workers from exposure to respirable crystalline silica — one for general industry and maritime, and the other for construction — in order to allow employers to tailor solutions to the specific conditions in their workplaces.

Who is affected by the general industry and maritime standard?

About 295,000 workers are exposed to respirable crystalline silica in over 75,000 general industry and maritime workplaces. Exposure to respirable crystalline silica can cause silicosis, lung cancer, other respiratory diseases, and kidney disease.

Some of the affected industries are shown below.

Number of Workers Exposed to Respirable Crystalline Silica in Selected General Industry/ Maritime Sectors		
Industry sector	Workers currently exposed	Workers currently exposed above the new PEL
Asphalt Roofing Materials	3,158	1,410
Concrete Products	32,981	9,391
Cut Stone	9,429	5,243
Dental Laboratories	31,105	864
Foundries	34,591	12,173
Jewelry	6,772	2,434
Porcelain Enameling	4,113	1,654
Pottery	6,269	2,496
Railroads	16,895	5,340
Ready-Mix Concrete	27,123	19,941
Shipyards	3,038	2,228
Structural Clay Products	7,893	3,198
Support Activities for Oil and Gas Operations	16,960	11,207

Source: OSHA Directorate of Standards and Guidance

OSHA estimates that over 100,000 workers in general industry and maritime are exposed to silica levels that exceed the new permissible exposure limit (PEL).

What does the standard require?

The standard for general industry and maritime requires employers to:

- Measure the amount of silica that workers are exposed to if it may be at or above an action level of **25 µg/m³** (micrograms of silica per cubic meter of air), averaged over an 8-hour day;
- Protect workers from respirable crystalline silica exposures above the permissible exposure limit of **50 µg/m³**, averaged over an 8-hour day;
- Limit workers' access to areas where they could be exposed above the PEL;
- Use dust controls to protect workers from silica exposures above the PEL;
- Provide respirators to workers when dust controls cannot limit exposures to the PEL;
- Restrict **housekeeping** practices that expose workers to silica where feasible alternatives are available;
- Establish and implement a **written exposure control plan** that identifies tasks that involve exposure and methods used to protect workers;
- Offer medical exams — including chest X-rays and lung function tests — every three years for workers exposed at or above the action level for 30 or more days per year;
- Train workers on work operations that result in silica exposure and ways to limit exposure; and
- **Keep records** of workers' silica exposure and medical exams.

Examples — Dust control methods

In most cases, dust controls such as wet methods and ventilation can be used to limit workers' exposure to silica. These technologies are widely available, affordable and already commonly used by many employers.



A worker cutting granite using a saw that applies water to the blade. The water reduces the amount of silica-containing dust that gets into the air.



Photo: Alliance — OSHA Cooperative Program

A worker grinding castings in a foundry. The work is performed in a ventilated booth to reduce the worker's exposure to silica.

When are employers required to comply with the standard?

General industry and maritime employers must comply with all requirements of the standard by **June 23, 2018**, except for the following:

- **Medical surveillance** must be offered to employees who will be exposed **at or above the action level** for 30 or more days a year starting on June 23, 2020. (Medical surveillance must be offered to employees who will be exposed **above the PEL** for 30 or more days a year starting June 23, 2018.)
- **Hydraulic fracturing** operations in the oil and gas industry must implement engineering controls to limit exposures to the new PEL by June 23, 2021.

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