

Practicing Proactive Silica Dust Housekeeping

by: Nilfisk, Inc.



Overview

1

What is Silica Dust?

2

Silica Dust Events and **NEW** OSHA Standard

3

Who's at Risk?

4

Proper Engineering Controls and Housekeeping Practices

What is SILICA Dust?

Crystalline Silica

- Mineral found abundantly in the earth's crust
- Most common form is quartz
- Found in many materials common on construction sites
- **Respirable** crystalline silica: very small particles at least 100 times smaller than ordinary sand

Brick



Concrete



Top Soil



Drywall



Stone



Asphalt



Source: OSHA - Safety and Health Topics: Silica, Crystalline

Why is Silica Dangerous?

Exposure to respirable dusts of high crystalline silica content can cause fatal lung diseases, including silicosis, lung cancer, other respiratory diseases and kidney failure.

- A NIOSH study in 2015 states that silicosis kills about **100 people per year**
- OSHA estimates that the new rule will save nearly **700 lives** and prevent more than **1,600 cases of silicosis EACH YEAR!**



Sources: <http://www.safetyandhealthmagazine.com/articles/13942-oshapublishes-final-rule-on-silica>; <http://www.ishn.com/articles/103916-compliance-challenges-of-oshas-new-silica-standard>

Silica-Related Diseases

- Types of silicosis:
 - **Acute:** extremely high levels of exposure resulting in symptoms within a few weeks
 - **Accelerated:** resulting from about 5 to 10 years of heavy exposure
 - **Chronic:** most frequently observed type of silicosis in the U.S. today, seen from consistent low exposure crystalline silica for 10 plus years



Healthy Lungs vs. Silicosis in Lungs

Source: OSHA - Safety and Health Topics: Silica, Crystalline
Photo Credit: <https://dolblog.sites.usa.gov/files/2013/08/Silica.jpg>

Silica Dust Events and NEW OSHA Standard

Timeline: From Risk to Resolution

Early 1900s

Granite cutters in Vermont recognize the connection between the dust they were inhaling and the resulting fatal illnesses

1931
Hawks Nest Tunnel Project (W. Virginia): *One of the worst industrial disasters in U.S. history*
Hundreds of workers died from silicosis. Another 1,500 reported to have contracted silicosis within the next two years

1971
OSHA set exposure limits for respirable silica (100 $\mu\text{g}/\text{m}^3$ for general industry; 250 $\mu\text{g}/\text{m}^3$ for construction)

1971
OSHA Established Occupational Health & Safety Administration

1996
World Health Organization classifies silica as a known human carcinogen

1996
OSHA creates Special Emphasis Program on Silica Dust

2013
OSHA announces proposed rule to lower worker exposure to crystalline silica

June 23, 2016
Effective date for OSHA final rule on new standard: permissible exposure limit of 50 $\mu\text{g}/\text{m}^3$ of respirable silica as an 8-hour time-weighted average

1700s
Evidence of silicosis in stone cutters identified by founder of occupational medicine

1938
Federal "Stop Silicosis" campaign initiated by the Department of Labor

1974
CDC/NIOSH issues criteria for a recommended standard to further reduce silica MELs

1997
1st time silica is listed on OSHA's Regulatory Agenda

1999
OSHA holds Stakeholders' Meetings on silica

2017 – 2021 DEADLINES
for compliance

New Final Rule

- Effective, June 23, 2016
- Rule(s) apply to General Industry, Maritime, Fracturing and Construction
- Covers engineering controls, protective clothing, medical surveillance and other issues
- **New Permissible exposure limit (PEL)** of 50 micrograms of respirable crystalline silica per cubic meter of air ($\mu\text{g}/\text{m}^3$), averaged over an eight-hour day
 - *Half the previous limit for industry and maritime*
 - *5x lower for construction industry*



Source: Occupational Exposure to Respirable Crystalline Silica Rule, 2016

New Final Rule: General Overview

Requirements for Employers:

- **Measure worker exposure** if it may be at or above an action level of 25 $\mu\text{g}/\text{m}^3$, averaged over an 8-hour day
- **Protect workers** from exposure above the PEL of 50 $\mu\text{g}/\text{m}^3$, averaged over an 8-hour day
- **Limit workers' access** to high-exposure areas; In general industry/maritime designate “regulated areas” where exposure could be above PEL
- **Set dust controls** to protect workers from exposures above the PEL
- **Provide respirators** to workers when dust controls cannot limit exposures to PEL
- **Written exposure** control plan that identifies tasks that involve exposure and protection methods
- **Offer medical exams** every three years for workers exposed above the PEL for 30 or more days per year
- **Train workers** on operations that expose them to in silica and ways to limit exposure
- **Keep records** of workers' silica exposure and medical exams

For construction, Table 1 in the standard is a set of specified controls that construction employers can follow for “greater certainty and ease of compliance” **without monitoring exposure....a type of safe harbor.**

How do the two standards differ?

- Table 1: Exposure Control Methods, if followed, removes requirement for exposure monitoring **ONLY FOR CONSTRUCTION**
- The construction rule requires the designation of a competent person, which the general industry rule does not, to make frequent and regular inspections of job sites, materials, and equipment to implement the written exposure control plan.
 - *Competent person = an individual who is capable of identifying existing and foreseeable silica hazards in the workplace and who has authorization to take prompt corrective measures to eliminate or minimize them*
- 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.
- The general industry/maritime rule contains the requirement for a “regulated area” and posting of warning signs at all entrances to regulated areas.



Exposure Assessment

Employers must assess the exposure of each of your employees who is or may reasonably be expected to be exposed to respirable crystalline silica at or above the action level. Unless, you fall under and abide by the Construction Standard's Table 1 Provisions.

- **Reviewing the results**
 - If employee exposures are below the action level → discontinue monitoring for those employees
 - If employee exposures are at or above the action level but at or below the PEL → repeat monitoring within 6 months
 - If employee exposures are above the PEL → repeat monitoring within three months
 - Repeat monitoring is required to meet action levels, with specific discontinuation provisions per paragraph (d)(4)
- **Reassessment of exposure:** whenever a change in the production, process, control equipment, personnel, or work practices may result in a change in exposure
- **Methods of sample analysis:** You must ensure that all samples taken to satisfy monitoring requirements are evaluated by a laboratory that analyzes air samples for respirable crystalline silica.
- **Employee notification of assessment results:** Within 15 working days, notify each affected employee in writing no matter the results. If corrective action is required, notification must include action steps.

Employer Compliance Deadlines

Construction Industry:

- Comply with all obligations of the standard, except methods of sample analysis, by June 23, 2017
- Comply with methods of sample analysis by June 23, 2018

General Industry and Maritime

- Comply with all obligations of the standard, except the action level trigger for medical surveillance, by June 23, 2018
- Offer medical examinations to employees exposed above the PEL for 30 or more days a year beginning on June 23, 2018
- Offer medical examinations to employees exposed at or above the action level for 30 or more days a year beginning on June 23, 2020

Hydraulic Fracturing:

- Comply with the engineering controls of the standard by June 23, 2021
- The extended time allows employers to provide medical exams to some workers, and gives hydraulic fracturing employers the opportunity to implement dust controls for the new PEL



Examples of Silica Dust Violations



Maxim Construction Group Corp.
Browntown, WI

28 health violations (three of them classified as repeat), \$274,500 in OSHA Fines; Refined in 3/2014 for repeat violations, \$50,600

Violation(s):

- Exposure to silica dust above the recommended exposure level under the national and regional emphasis program on primary metal industries for crystalline silica dust

February 7, 2013 & March 31, 2014



Baltazar's Stone Inc.
Omaha, NE

13 serious violations, \$40,921 in OSHA Fines

Violation(s):

- Allowing three stonecutters to be exposed to silica at levels nearly 3x to PEL
- Failing to implement administrative and engineering controls to reduce exposure
- Failing to train workers on silica hazards.

May 19, 2014



A Fast Blast
Springfield, MA

17 serious violations, \$47,600 in OSHA Fines

Violation(s):

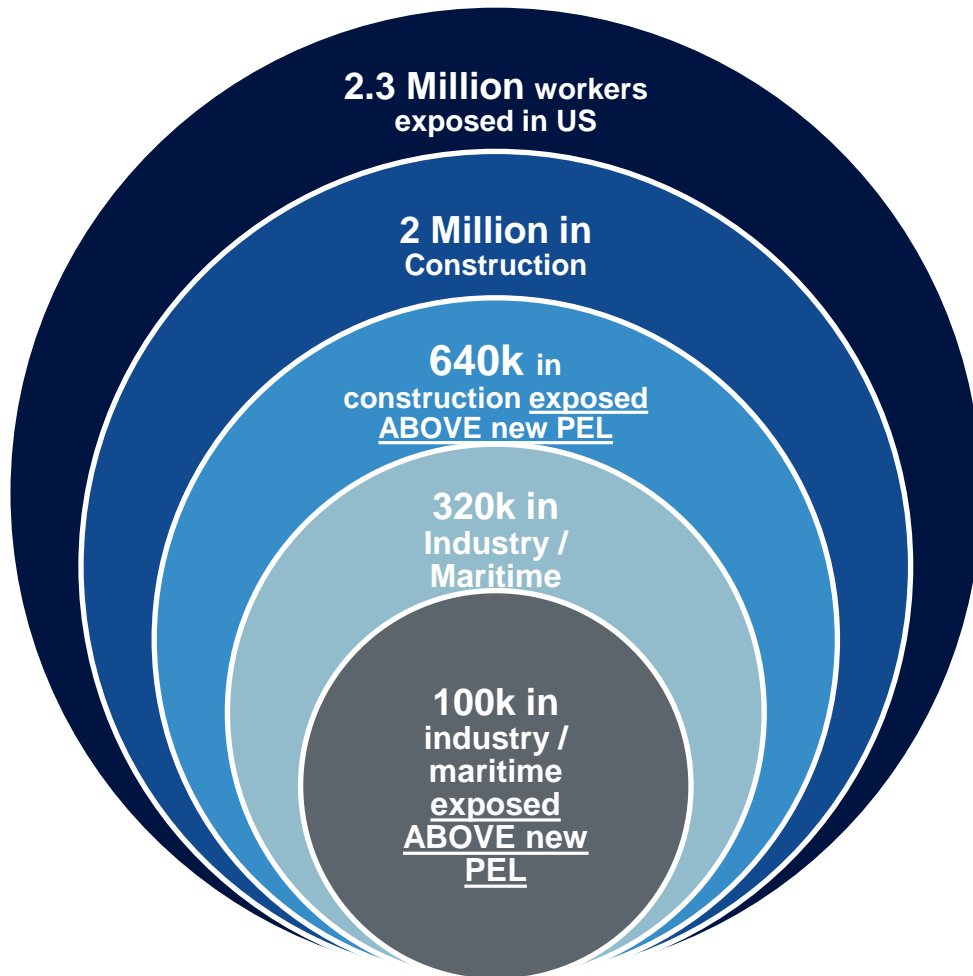
- Exposure to airborne concentrations of lead and silica generated by the abrasive blasting, in excess of permissible exposure limits.
- Lack of engineering controls to reduce exposure
- Deficiencies in respirators and medical evals

July 17, 2014

Who's at Risk?

Who's at Risk?

Workers Exposed to Silica Dust



Approximately

**676,000
workplaces**

affected, including sites in
construction and general
industry and maritime.

Construction Industry



Source: Proposed Occupational Exposure to Respirable Crystalline Silica Rule, 2013

General Industry & Maritime



Source: Proposed Occupational Exposure to Respirable Crystalline Silica Rule, 2013

Proper Engineering Controls & Housekeeping Practices

Engineering Controls

Employers must use engineering controls and work practices as the primary way to keep exposure at or below the PEL.

- Local Exhaust Ventilation (LEV)
- Substitute materials
- Personal protective equipment (PPE)
- Dust containment system
- Wet methods
- High efficient particulate air (HEPA) filtrated equipment/vacuums
- Housekeeping procedures
- **Written Control Plans!**



Respirators are not to be the sole control measure. They are only to be used in conjunction with proper engineering controls and work practices to maintain exposures at or below the PEL.

Source: OSHA Silica Standard, 2016

Safe Harbor with Table 1, for Construction ONLY

Table 1 matches common construction tasks with dust control methods to limit worker exposures to silica.

- Employers know exactly what they need to do for every job and every worker.
- Recommended dust control measures are known to be effective.
- Respirators may be needed in addition to control methods.

If an employer chooses to use a method in Table 1, they would not need to measure workers' exposure to silica.

16878 Federal Register / Vol. 81, No. 58 / Friday, March 25, 2016 / Rules and Regulations

TABLE 1—SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA—Continued

Equipment/task	Engineering and work practice control methods	Required respiratory protection and minimum assigned protection factor (APF)	
		<4 hours/shift	≥4 hours/shift
(h) Handheld grinders for mortar removal (i.e., backsparging)	Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism. —When used outdoors: Use grinder equipped with a collection system. —When used indoors or in an enclosed area: Use grinder equipped with a collection system.	None	APF 10, APF 10, APF 25.
(i) 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.
(j) 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: —When used outdoors: —When used indoors or in an enclosed area: For tasks performed outdoors only: Use saw equipped with commercially available dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	APF 10, APF 10.
(k) Handheld power saws for cutting fiber-cement board (with blade diameter of 8 inches or less)	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: —When used outdoors: —When used indoors or in an enclosed area: For tasks performed outdoors only: Use saw equipped with commercially available dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	APF 10, APF 10.
(l) Walk-behind 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: —When used outdoors: —When used indoors or in an enclosed area: For tasks performed outdoors only: Use saw equipped with commercially available dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	APF 10, APF 10.
(m) Drivable 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: —When used outdoors: —When used indoors or in an enclosed area: For tasks performed outdoors only: Use saw equipped with commercially available dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	APF 10, APF 10.
(n) Rig-mounted core saws or drills	Use tool 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: —When used outdoors: —When used indoors or in an enclosed area: For tasks performed outdoors only: Use tool equipped with commercially available shroud or cooling with dust collection system.	None	APF 10, APF 10.
(o) Handheld and stand-mounted drills (including impact and rotary hammer drills)	Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism. Use a HEPA-filtered vacuum when clearing holes. For tasks performed outdoors only: Use shroud around drill bit with a dust collection system. Dust collector must have a filter with 99% or greater efficiency and a filter-cleaning mechanism. Use a HEPA-filtered vacuum when clearing holes. Use dust collection system with close capture hood or shroud around drill bit with a low-flow water spray to wet the dust at the discharge point from the dust collector.	APF 10	APF 10.
(p) Vehicle-mounted drilling rigs for rock and concrete	Operate from within an enclosed cab and use water for dust suppression on drill bit. Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact. —When used outdoors: —When used indoors or in an enclosed area: OR Use tool equipped with commercially available shroud and dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	APF 10, APF 10.
(q) Jackhammers and handheld powered chipping tools	Operate from within an enclosed cab and use water for dust suppression on drill bit. Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact. —When used outdoors: —When used indoors or in an enclosed area: OR Use tool equipped with commercially available shroud and dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	APF 10, APF 10.