OSHA's Respirable Crystalline Silica Rule

OSHA® Occupational Safety and Health Administration

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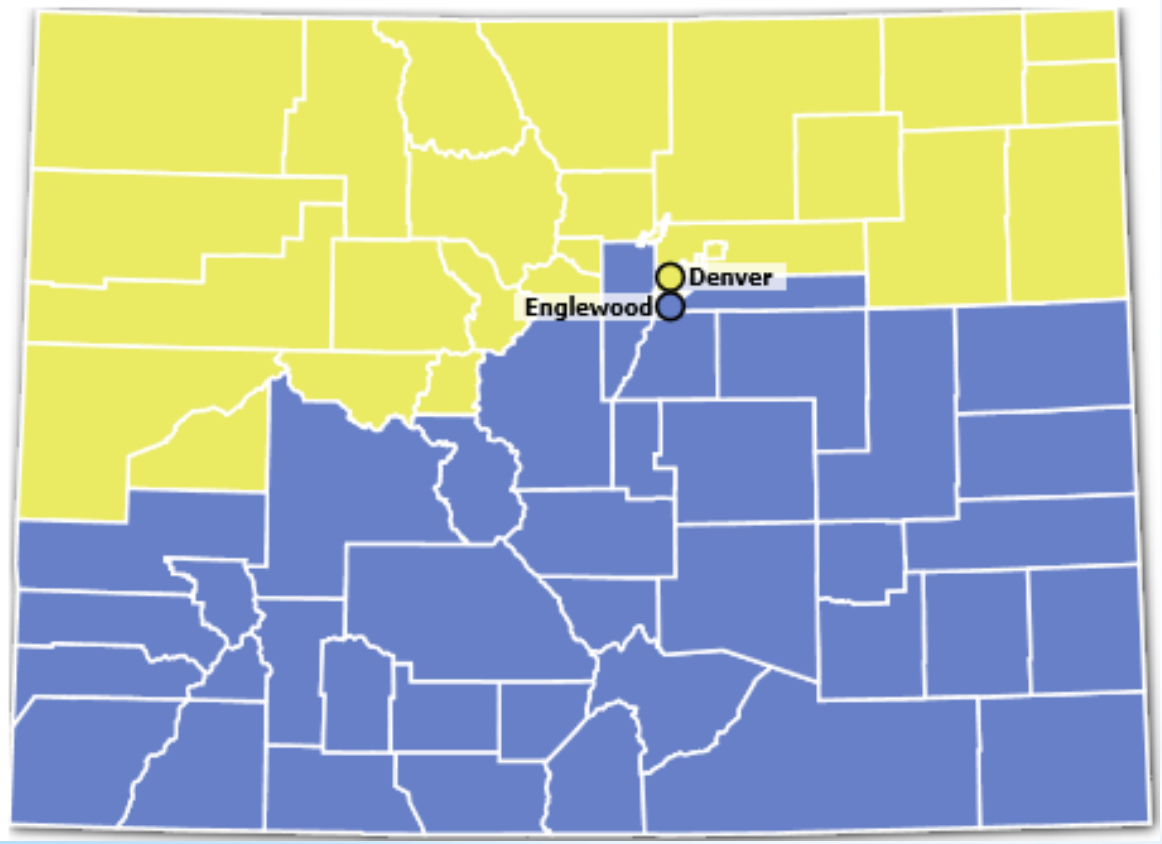

Englewood AO
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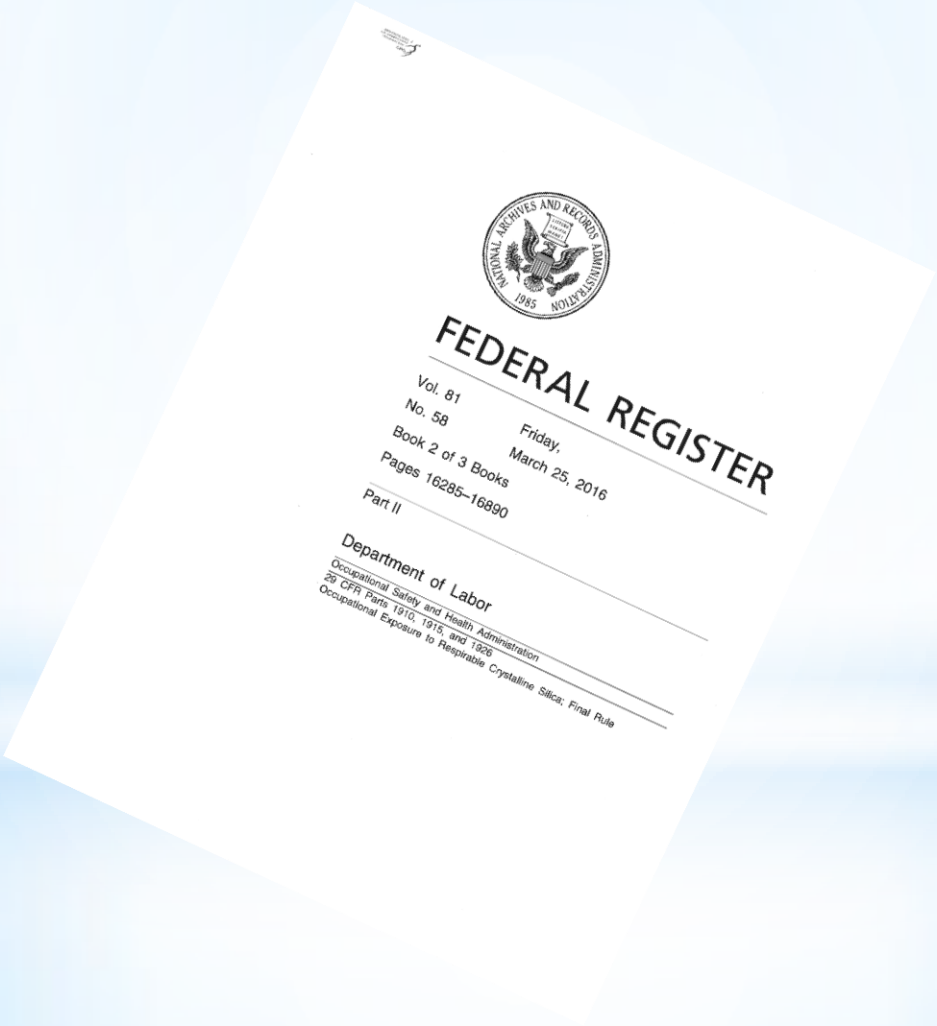
Final Rule Published on March 25, 2016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Part II

Department of Labor

Occupational Safety and Health Administration

29 CFR Parts 1910, 1915, and 1926

Occupational Exposure to Respirable Crystalline Silica; Final Rule

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Reasons for the Rule

- Current permissible exposure limits (PELs) are formulas that many find hard to understand
- Construction/shipyard PELs are obsolete particle count limits
- General industry formula PEL is about equal to 100 $\mu g/m^3$; construction/shipyard formulas are about 250 $\mu g/m^3$

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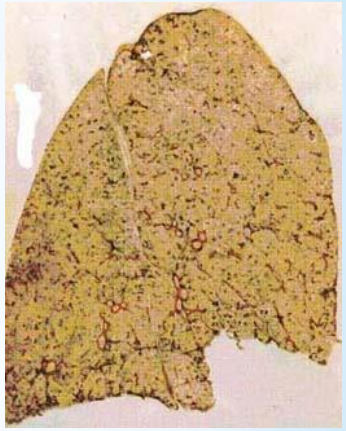
Most Important Reason for the Rule

- Current PELs do not adequately protect workers
- Extensive epidemiologic evidence that lung cancer and silicosis occur at exposure levels below 100 $\mu g/m^3$

Exposure and Health Risks

Exposure to respirable crystalline silica has been linked to:

- Silicosis;
- Lung cancer;
- Chronic obstructive pulmonary disease;
- Kidney disease; and
- Autoimmune disorders (ie rheumatoid arthritis)



Healthy Lung

Silicotic Lung

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Health Benefits

OSHA estimates that once the effects of the rule are fully realized, it will prevent:

- More than 600 deaths per year
  - Lung cancer: 124
  - Silicosis and other non-cancer lung diseases: 325
  - End-stage kidney disease: 193
- More than 900 new silicosis cases per year

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Scope of Coverage

- Three forms of silica: quartz, cristobalite and tridymite
- Exposures from chipping, cutting, sawing, drilling, grinding, sanding, and crushing of concrete, brick, block, rock, and stone products (such as in construction operations)
- Exposures from using sand products (such as glass manufacturing, foundries, and sand blasting)

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Industries and Operations with Exposures

- Construction
- Glass manufacturing
- Pottery products
- Structural clay products
- Concrete products
- Foundries
- Dental laboratories
- Paintings and coatings
- Jewelry production
- Refractory products
- Asphalt products
- Landscaping
- Ready-mix concrete
- Cut stone and stone products
- Abrasive blasting in:
  - Maritime work
  - Construction
  - General industry
- Refractory furnace installation and repair
- Railroads
- Hydraulic fracturing for gas and oil

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Workers and Industries Affected

- 2.3 million workers:
  - Construction: 2 million
  - GI/Maritime: 300,000
- 676,000 establishments
  - Construction: 600,000
  - GI/Maritime: 76,000

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General Industry/Maritime Standard

(a) Scope
(b) Definitions
(c) Permissible exposure limit (PEL)
(d) Exposure assessment
(e) Regulated areas
(f) Methods of compliance
    (1) Engineering and work practice controls
    (2) Written exposure control plan
(g) Respiratory protection
(h) Housekeeping
(i) Medical surveillance
(j) Communication of silica hazards
(k) Recordkeeping
(l) Dates

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General Industry/Maritime - Scope

- All occupational exposures to respirable crystalline silica are covered, unless objective data shows exposures remain below 25 µg/m^3 as an 8-hr TWA under any foreseeable conditions.
- Agricultural operations and exposures resulting from processing of sorptive clays are not covered.
- General industry employers can follow the construction standard in some very limited circumstances.

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Permissible Exposure Limit (PEL)

- PEL = 50 µg/m^3 as an 8-Hour TWA
- Action Level = 25 µg/m^3 as an 8-Hour TWA

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Exposure Assessment

- Required if exposures are or may reasonably be expected to be at or above action level of 25 µg/m^3
- Exposures assessments can be done following:
  - The performance option
  - The scheduled monitoring option.

General Industry/Maritime - Regulated Areas

- Required where exposures can reasonably be expected to exceed the PEL
- Must be demarcated in any manner that limits workers in the area
- Must post warning signs at entrances
- Respirator use required

Methods of Compliance – Hierarchy of Controls

- Employers can use any engineering or work practice controls to limit exposures to the PEL
- Respirators permitted where PEL cannot be achieved with engineering and work practice controls

Engineering Controls

Grinding stone
without engineering controls

Polishing stone using water to control the dust

Engineering Controls

Grinding without engineering controls

Grinding using a vacuum dust collector

Engineering Controls (cont.)

Jackhammer use without engineering controls

Jackhammer use with water spray to control dust

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General Industry/Maritime - Written Exposure Control Plan

- The plan must describe:
  - Tasks involving exposure to respirable crystalline silica
  - Engineering controls, work practices, and respiratory protection for each task
  - Housekeeping measures used to limit exposure

Respiratory Protection

- Must comply with 29 CFR 1910.134
- Respirators required for exposures above the PEL:
  - While installing or implementing controls or work practices
  - For tasks where controls or work practices are not feasible
  - When feasible controls cannot reduce exposures to the PEL
  - While in a regulated area (General Industry/Maritime)

Housekeeping

- When it can contribute to exposure, employers must not allow:
  - Dry sweeping or brushing
  - Use of compressed air for cleaning surfaces or clothing, unless it is used with ventilation to capture the dust
- Those methods can be used if no other methods like HEPA vacuums, wet sweeping, or use of ventilation with compressed air are feasible

General Industry/Maritime - Medical Surveillance

- Employers must offer medical examinations to workers:
  - Who will be exposed above the action level for 30 or more days a year
- Employers must offer examinations every three years to workers who continue to be exposed above the trigger
- Exam includes medical and work history, physical exam, chest X-ray, and pulmonary function test (TB test on initial exam only)

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Communication of Hazards

- Employers required to comply with hazard communication standard (HCS) (29 CFR 1910.1200)
- Address: Cancer, lung effects, immune system effects, and kidney effects as part of HCS
- Train workers on health hazards, tasks resulting in exposure, workplace protections, and medical surveillance.

Recordkeeping

- Must maintain records per 29 CFR 1910.1020 for:
  - Air monitoring data
  - Objective data
  - Medical records

General Industry/Maritime - Compliance Dates

- Employers must comply with all requirements of the standard by June 23, 2018, except :
  - Employers must comply with the action level trigger for medical surveillance by June 23, 2020. (The PEL is the trigger from June 23, 2018 through June 23, 2020.)
  - 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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Construction

(a) Scope

(b) Definitions

(c) Specified exposure control methods

OR

(d) Alternative exposure control methods

- PEL
- Exposure Assessment
- Methods of Compliance

(e) Respiratory protection

(f) Housekeeping

(g) Written exposure control plan

(h) Medical surveillance

(i) Communication of silica hazards

(j) Recordkeeping

(k) Dates

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Construction - Specified Exposure Control Methods

- Table 1 in the construction standard matches 18 tasks with effective dust control methods and, in some cases, respirator requirements.
- Employers that fully and properly implement controls on Table 1 do not have to:
  - Comply with the PEL
  - Conduct exposure assessments for employees engaged in those tasks

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
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 manufacturers' instruction to minimize dust - When used outdoors - When used indoors or in an enclosed area	None APF 10	APF 10 APF 10

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

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
Vehicle-mounted drilling rigs for rock and concrete	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. OR Operate from within an enclosed cab and use water for dust suppression on drill bit.	None None	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

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Construction - Written Exposure Control Plan

- The plan must describe:
  - Tasks involving exposure to respirable crystalline silica
  - Engineering controls, work practices, and respiratory protection for each task
  - Housekeeping measures used to limit exposure
  - Procedures used to restrict access, when necessary to limit exposures

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Construction - Competent Person

- Construction employers must designate a competent person to implement the written exposure control plan
- *Competent person* is an individual capable of identifying existing and foreseeable respirable crystalline silica hazards, who has authorization to take prompt corrective measures
- Makes frequent and regular inspection of job sites, materials, and equipment

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Construction - Medical Surveillance

- Employers must offer medical examinations to workers:
  - Who will be required to wear a respirator under the standard for 30 or more days a year.
- Employers must offer examinations every three years to workers who continue to be exposed above the trigger
- Exam includes medical and work history, physical exam, chest X-ray, and pulmonary function test (TB test on initial exam only)

Construction - Compliance Dates

- Employers must comply with all requirements (except methods of sample analysis) by June 23, 2017 (*delayed to 9/23/17)
- Compliance with methods of sample analysis required by June 23, 2018

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New Resources

Fact Sheets available for all 18 Table 1 listed tasks

https://www.osha.gov/dsg/topics/silicacrystalline/construction.html#tableOneTasks

OSHA® FactSheet

Controlling Silica Exposures in Construction While Operating Handheld Masonry Saws

Silica is a mineral that is found in stone, soil and sand. It is also found in concrete, brick, mortar and other construction materials. Breathing in silica dust can cause silicosis, a serious lung disease. Using a handheld masonry saw to cut concrete, stone, brick and similar materials can expose workers to hazardous levels of airborne silica. The small particles easily become suspended in the air and, when inhaled, penetrate deep into workers' lungs. This fact sheet describes ways to reduce workers' exposures to silica when using handheld masonry saws to cut masonry products.

Handheld masonry saw without dust controls creates silica dust while cutting cinder blocks. (Photo courtesy of New Jersey Department of Health).

Handheld masonry saw using water for dust control while cutting cinder blocks. (Photo courtesy of New Jersey Department of Health).

Silica Dust Control Methods

There are two main methods used to control silica dust while operating a handheld saw:

- **Wet cutting**, and
- **Vacuum dust collection systems.**

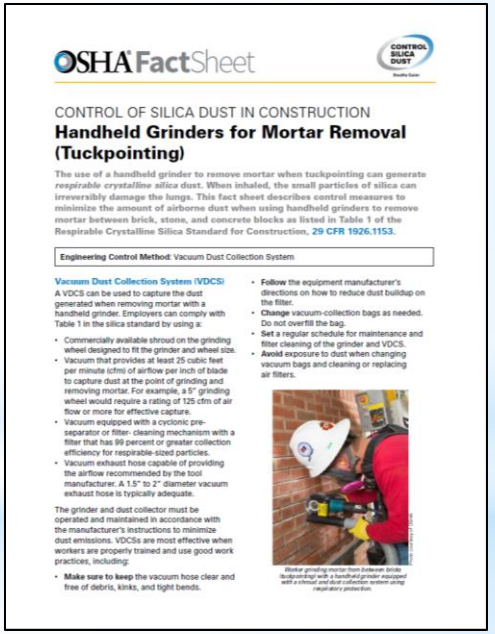
Wet Cutting

Wet cutting is a good way to reduce the amount of silica dust that becomes airborne because it controls the exposure at its source. Water can be supplied to the saws by either a pressurized container or by a constant water source such as a hose connected to a faucet.

Employers are responsible for keeping equipment in good condition to minimize dust and for training workers on how to use the equipment.

- **Check** that hoses are securely connected and are not cracked or broken.
- **Adjust** nozzles so that water goes to the cutting area but still cools the blade.
- **Maintain** saws and dust-control equipment based on the manufacturer's recommendations and maintenance schedule.

Handheld Masonry Saws



OSHA® FactSheet

CONTROL OF SILICA DUST IN CONSTRUCTION

Handheld Grinders for Mortar Removal (Tuckpointing)

The use of a handheld grinder to remove mortar when tuckpointing can generate *respirable crystalline silica* dust. When inhaled, the small particles of silica can irreversibly damage the lungs. This fact sheet describes control measures to minimize the amount of airborne dust when using handheld grinders to remove mortar between brick, stone, and concrete blocks as listed in Table 1 of the Respirable Crystalline Silica Standard for Construction, **29 CFR 1926.1153.**

Engineering Control Method: Vacuum Dust Collection System

Vacuum Dust Collection System (VDCS)

A VDCS can be used to capture the dust generated when removing mortar with a handheld grinder. Employers can comply with Table 1 in the silica standard by using a:

- Commercially available shroud on the grinding wheel designed to fit the grinder and wheel size.
- Vacuum that provides at least 25 cubic feet per minute (cfm) of airflow per inch of blade to capture dust at the point of grinding and removing mortar. For example, a 5" grinding wheel would require a rating of 125 cfm of air flow or more for effective capture.
- Vacuum equipped with a cyclonic pre-separator or filter- cleaning mechanism with a filter that has 99 percent or greater collection efficiency for respirable-sized particles.
- Vacuum exhaust hose capable of providing the airflow recommended by the tool manufacturer. A 1.5" to 2" diameter vacuum exhaust hose is typically adequate.

The grinder and dust collector must be operated and maintained in accordance with the manufacturer's instructions to minimize dust emissions. VDCSs are most effective when workers are properly trained and use good work practices, including:

- **Make sure to keep** the vacuum hose clear and free of debris, kinks, and tight bends.
- **Follow** the equipment manufacturer's directions on how to reduce dust buildup on the filter.
- **Change** vacuum-collection bags as needed. Do not overfill the bag.
- **Set** a regular schedule for maintenance and filter cleaning of the grinder and VDCS.
- **Avoid** exposure to dust when changing vacuum bags and cleaning or replacing air filters.

Worker grinding mortar from between bricks ("tuckpointing") with a handheld grinder equipped with a shroud and dust collection system using respiratory protection.

Handheld Grinders (Tuckpointing)

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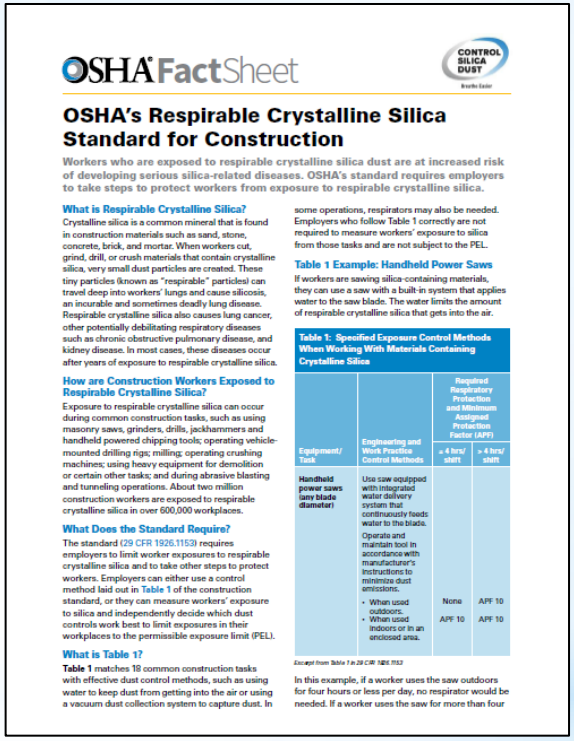
Construction Fact Sheet

Newly revised to remove references to tasks not covered by the scope



OSHA FactSheet

CONTROL SILICA DUST

OSHA's Respirable Crystalline Silica Standard for Construction

Workers who are exposed to respirable crystalline silica dust are at increased risk of developing serious silica-related diseases. OSHA's standard requires employers to take steps to protect workers from exposure to respirable crystalline silica.

What is Respirable Crystalline Silica?

Crystalline silica is a common mineral that is found in construction materials such as sand, stone, concrete, brick, and mortar. When workers cut, grind, drill, or crush materials that contain crystalline silica, very small dust particles are created. These tiny particles (known as "respirable" particles) can travel deep into workers' lungs and cause silicosis, an incurable and sometimes deadly lung disease. Respirable crystalline silica also causes lung cancer, other potentially debilitating respiratory diseases such as chronic obstructive pulmonary disease, and kidney disease. In most cases, these diseases occur after years of exposure to respirable crystalline silica.

How are Construction Workers Exposed to Respirable Crystalline Silica?

Exposure to respirable crystalline silica 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; using heavy equipment for demolition or certain other tasks; and during abrasive blasting and tunneling operations. About two million construction workers are exposed to respirable crystalline silica in over 600,000 workplaces.

What Does the Standard Require?

The standard (29 CFR 1926.1153) requires employers to limit worker exposures to respirable crystalline silica and to take other steps to protect workers. 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 in their workplaces to the permissible exposure limit (PEL).

What is Table 1?

Table 1 matches 18 common construction tasks with effective dust control methods, such as using water to keep dust from getting into the air or using a vacuum dust collection system 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 from those tasks 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.		
	• When used outdoors.	None	APF 10
	• When used indoors or in an enclosed area.	APF 10	APF 10

Excerpt from Table 1 to 29 CFR 1926.1153

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

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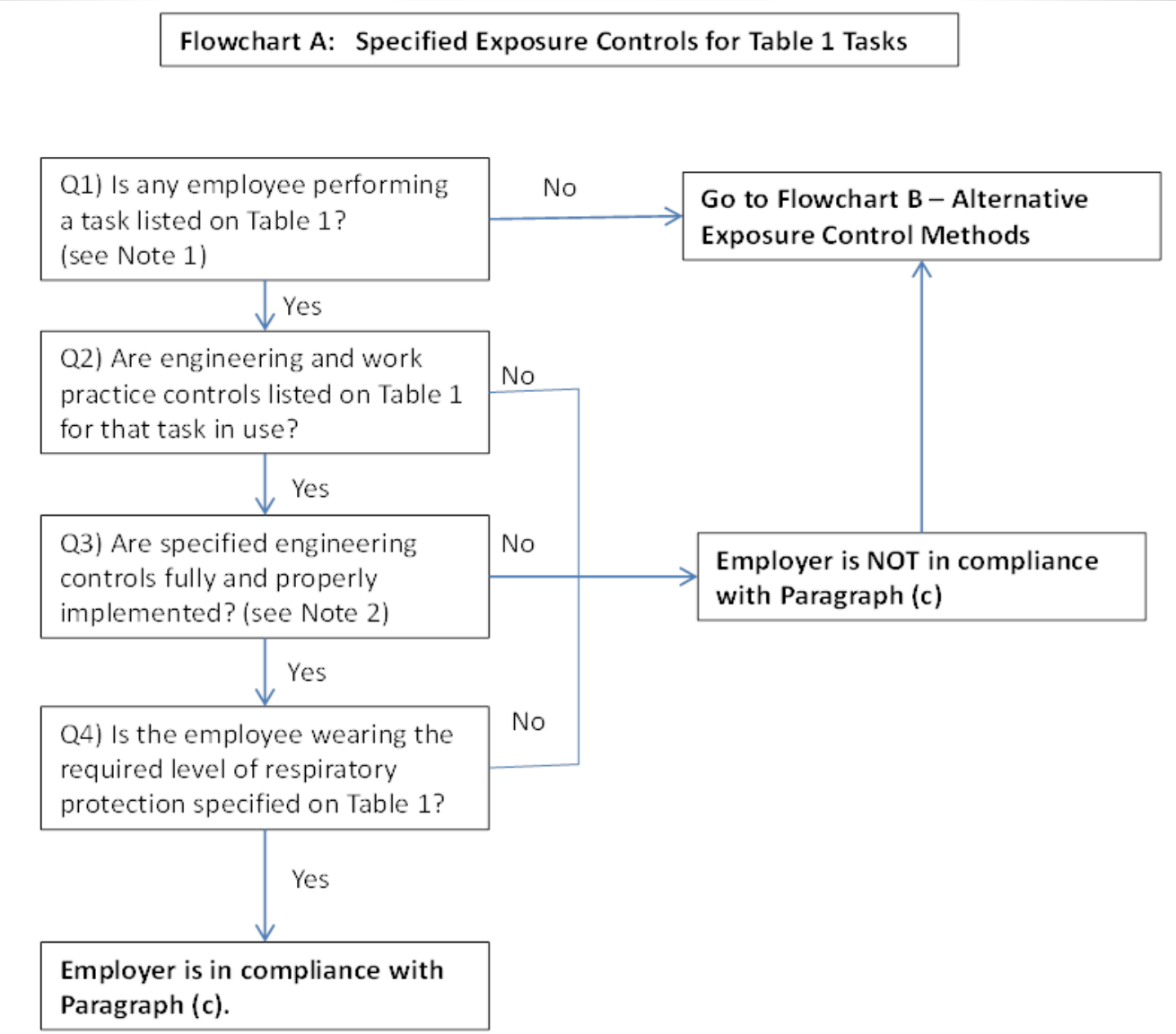
Enforcement

- September 23, 2017 – OSHA released memo providing for compliance assistance focus for the first 30 days

- October 19, 2017 – OSHA released Interim Enforcement Guidance to provide inspection guidance to compliance officers

Interim Enforcement Guide



Guidance and Outreach

- Silica Rulemaking Webpage: www.osha.gov/silica
  - Fact sheets
  - FAQs
  - Video
- Appendix B – Medical Surveillance Guidelines
- Coming soon after publication:
  - PowerPoint template
  - Small Entity Compliance Guides

Guidance and Outreach

* Center for Construction Research and Training (CPWR)
  * E-tool to:
    * Assess silica hazards
    * Select controls
    * Create a plan

OSHA Consultation

* Free
* Confidential
* On-site audits
* Training
* Sampling/Monitoring
* Program Review

http://csu-cvmbs.colostate.edu/academics/erhs/osha/Pages/default.aspx

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Disclaimer

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