Respirable Silica Program for Light Industrial Contractors

Last Revised: November 18, 2019

**This program was developed by FCA International in collaboration and consultation with Safety Controls Technology, Inc., the Northern Ohio Painting and Taping Contractors Association, Inc. and other FCA contractors, associations and industry partners.**
This silica package was assembled to provide basic information and guidance to contractors regarding the OSHA Respirable Silica Rule. Each section is laid out for ease of use and can be modified to fit within a company’s policies.

Here’s a list of what’s in this package and how you can utilize it.

- **Compliance Checklist** – lays out the basic steps required for OSHA Silica Rule compliance.

- **Competent Person** – lists the basic criteria your Silica Competent Person must know.

- **Model Silica Policy & Program** – a simplified silica program a contractor can use to show their overall company policy on silica. **This is not required by OSHA.** However, many contractors have used it to show their customers, General Contractors and other interested parties their company’s commitment to maintaining a silica-safe working environment.

- **Written Silica Exposure Control Plan** – an example of a simplified plan used by contractors. A Written Silica Exposure Control Plan is only required by OSHA when Respirable Silica Exposure levels surpass the PEL.

  Employers must protect workers from respirable crystalline silica exposures above the PEL of 50 μg/m³, averaged over an eight-hour day. They must use engineering controls and safer work methods to protect workers from silica exposures above the PEL and provide respiratory protection to workers when engineering controls and safer work methods cannot limit exposures below the PEL. Contractors should follow the respiratory protection policies in their company’s respiratory protection program.

- **OSHA Table 1** – a listing of 18 respirable silica-producing tasks. This information can be used by contractors to support and develop the specific written exposure control plans for their company. Overall, testing shows exposures over the Action level for Respirable Silica for Abrasive blasting. Following the engineering controls and respiratory protections in OSHA’s Table 1 and OSHA’s Abrasive Blasting Guide will help keep you in compliance with the Respirable Silica Rule.

- **Respirable Crystalline Silica Exposure Monitoring Methodology** – this is the Industrial Hygiene criteria and methodology used in our internal testing. This is provided to demonstrate the quality of the exposure assessments conducted during our internal testing, as well as provide guidance if you need to or would like to do your own exposure monitoring.

- **Additional Silica Resources** – several additional resources to help your company understand the silica rule and maintain compliance. The resources included are: OSHA 3697 Abrasive Blasting Fact Sheet, OSHA Silica Rule Table 1 Tasks, OSHA 3681 Silica Fact Sheet, and the FCA Silica Safety Talk.
Light Industrial Painting Contractors’ Package
To Protect Workers and Assist in Complying with the OSHA Silica Standard: 29 CFR 1926.1153

1. OSHA Compliance Checklist
2. The Competent Person
3. Model Silica Policy & Program
4. Exposure Control Plan Example
5. Respirable Crystalline Silica Exposure Monitoring
6. Additional Resources
1. OSHA Compliance Checklist

Respirable Crystalline Silica Rule - 29 CFR 1926.1153 Compliance Checklist

☐ Identify all tasks that could produce respirable crystalline silica (RCS).

☐ Implement engineering controls and respiratory protection for tasks that may exceed the PEL Level of 50 µg/m³ during an 8-hr shift.

☐ Perform air monitoring or use objective data to establish a baseline of exposure for all light industrial coating applications, substrate preparation and associated tasks and reassess exposures when work practices or control measures may result in exposures above the Action Level.

☐ Establish a written company Silica Program that includes the following elements:
  o A written silica exposure control plan for each task that produces respirable silica.
  o Use engineering and work practice controls to minimize exposures.
  o Use of proper housekeeping methods to minimize exposures.
  o A respiratory protection program (1926.103) and utilization of proper respiratory protection where exposures exceed the Action Level.
  o Assignment of a Competent Person with required silica awareness training. This person has the authority to review all jobsite conditions and tasks and adjust controls if workers may be exposed to respirable silica (see Section 2).
  o Silica awareness training, education and hazard communication on any tasks that may expose the workforce to respirable silica. Workers must be aware of the written silica exposure control plan and be able to identify the company’s Competent Person.
  o Medical monitoring for anyone using respiratory protection more than 30 total days in a calendar year.
  o Recordkeeping of monitoring data, objective data, medical surveillance and training.
2. The Competent Person

OSHA defines the Competent Person as: “…an individual who is capable of identifying existing and foreseeable respirable crystalline silica hazards in the workplace and who has authorization to take prompt corrective measures to eliminate or minimize them.” The Competent Person must have the knowledge and ability necessary to implement the Exposure Control Plan.

Ten Objectives for Silica Competent Person Training

1. Introduction to Competent Person
   ➢ Describe role, typical tasks, understand authority and the standard.

2. Introduction to Silica
   ➢ What it is, where it’s found and materials that contain crystalline silica.

3. Silica Hazards and Exposure
   ➢ Routes of exposure, health effects, obstacles to worker recognition of silica illnesses and aligning standards (hazard communication, respiratory protection).

4. Determining if Silica is Present
   ➢ Hazard assessment requirements of the standard, knowledgeable about Table 1, use of Safety Data Sheets (SDS) to determine presence of silica.

5. Potential Worker Exposure Levels for Common Tasks Without Controls
   ➢ Exposure levels of common tasks, be able to identify common situations that could result in higher exposures, identify situations when an Industrial Hygienist should be called in for further evaluation.

6. Controls Used to Reduce Silica Exposures
   ➢ Engineering, administrative and PPE.

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1 OSHA Silica Standard - Table 1: SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA.

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.
7. Oversight and Quality Assurance
   - Understand the need for monitoring by an Industrial Hygienist to ensure program effectiveness for tasks not included in Table 1.

8. Review of OSHA’s Silica Standard
   - Using Table 1, exposure assessment, written exposure control plans, medical surveillance program, action levels and permissible exposure level.

9. Authority: Responsibilities and Procedures
   - Understand responsibility and authority to act, describe key corrective actions or job shutdown and understand communication requirements for other workers and other parties exposed.

10. Mock Job Examples Exercises
    - Developing Written Exposure Control Plans, utilizing Table 1 and jobsite scenarios.
Silica Program

*Implementation Date:*

*Last Revised: November 18, 2019*
3. **Model Silica Policy and Program**

**Policy**

**COMPANY NAME** is subject to the OSHA Silica regulations, because we have employees who work in the construction industry. Regardless of whether or not we work with materials that contain silica, we also have specific responsibilities to protect our employees from inhalation of respirable\(^1\) crystalline silica hazards, which could be present at any site they work.

Inhalation of respirable silica has been shown to cause lung cancer, pulmonary tuberculosis and other airway diseases, including silicosis (which has no cure). Our employees may be exposed to respirable crystalline silica from abrasive blasting, sanding and preparation of the substrates, and clean-up of dust and debris remaining in the work area where silica-containing materials, such paint materials and other materials containing silica have been installed and worked.

**COMPANY NAME** has responsibilities to take specific actions to protect the health and safety of our employees whenever they are engaged in such activity, even though the work which resulted in the dust may have been performed by other workers.

**Program**

A. **Competent Person:** **COMPANY NAME** leadership has assigned a Competent Person who will supervise all jobs involving potential exposure to suspected silica-containing materials. The Competent Person has received specialized training to identify silica hazards, how to select the best control strategy and is authorized to take prompt action to correct or eliminate problems.

B. **Training:** **COMPANY NAME** provides awareness training for all employees who may be exposed to silica or work at job sites where silica dust may be present. The training is documented, and the records are available to employees, employees’ representatives and site owners where employees are working.

C. **Exposure Assessment:** **COMPANY NAME** will conduct exposure assessments to determine exposures to respirable silica particles in excess of the Action Level unless objective data shows exposure levels are below the Action Level under consistent conditions, work practices and established controls.

D. **PPE and Respiratory Protection:** **COMPANY NAME** will provide personal protective equipment (PPE) such as N95 dust masks or respirators with particulate cartridges. Protective clothing and other PPE are provided at no cost to the employee.

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\(^{1}\) “Respirable” silica is that portion of airborne dust with a particle size below 10 µm – these particles penetrate the deep alveolar region of the lung.
Respirators will be selected based upon measured exposure levels and the assigned protection factors (APF).^2

E. Engineering and Administrative Controls: COMPANY NAME prohibits the use of high-speed abrasive disk sanders without HEPA-filtered exhausts or point-of-cut ventilators, use of compressed air without capture device, dry sweeping/shoveling or other dry clean-up and employee rotation to circumvent permissible exposure limits. HEPA vacuums must be used to clean up dust settled on surfaces. Wet methods or wetting agents (unless not feasible) and appropriate work practices must be followed. Prompt clean-up and disposal of dust and debris in leak-proof containers is required.

Decontamination procedures: work clothing will be HEPA vacuumed and equipment decontaminated on a plastic drop cloth if clean-up takes place in a regulated area.

F. Regulated Areas: COMPANY NAME requires that a regulated area be established for areas and activities where workers are exposed to respirable silica above the PEL for 30 or more days per year. It may be demarcated in any manner that minimizes the number of persons in the area and protects persons outside the area from exposure to airborne silica. Signs must be provided and displayed. Signs and labels identify the material which is present, its location, and appropriate work practices which, if followed, will ensure that silica containing material and/or presumed silica containing material will not be disturbed and will ensure that employees working in and adjacent to regulated areas comprehend the warning signs. Smoking is not allowed in the work area.

G. Medical surveillance: COMPANY NAME provides medical surveillance for all workers who may be exposed above the Action Level for 30 days or more per year.

H. Other contractors: If COMPANY NAME’s employees are working immediately adjacent to a silica job and may be exposed to silica due to the inadequate containment of such job by another contractor, COMPANY will either remove the employees from the area until the enclosure breach is repaired or perform an initial exposure assessment.

I. Recordkeeping: a copy of the written exposure control plan will be available to all employees. Accurate records of all air monitoring data, objective data, training and medical surveillance shall be maintained at all times.

J. COMPANY NAME’s Silica Program will be reviewed by the Safety Officer and Company President at least annually to determine its effectiveness and to adjust to any changes in OSHA standards.

^2 N-95 dust masks and dual cartridge ½ mask respirators have an APF = 10 if properly fitted, meaning the concentration of dust outside the respirator is reduced by a factor of 10. Thus, if the concentration of airborne RCS is 135 µg/m³ then the concentration inhaled by the wearer should be no more than 13.5 µg/m³
4. Exposure Control Plan Example

*** Only required for tasks that exceed the PEL for Respirable Silica ***
Follow Table 1 guidelines for all tasks identified on OSHA Table 1

Company: [INSERT COMPANY]
Date: [INSERT DATE]

Person Completing the Plan; Title: [INSERT NAME/TITLE]

1. Description of Task: [IDENTIFY TASK].

   a) Engineering Controls:
      a. [IDENTIFY ENGINEERING CONTROL(S)]

   b) Work Practices:
      a. [IDENTIFY WORK PRACTICE(S)]

   c) Respiratory Protection:
      (only needed if engineering controls and work practices cannot reduce the silica exposure below the PEL):
      a. [IDENTIFY OSHA-COMPLIANT RESPIRATORY PROTECTION]

   d) Housekeeping:
      a. [IDENTIFY HOUSEKEEPING METHOD(S)]

   e) Regulated Areas:
      a. [IDENTIFY PLAN TO DEMARCATE REGULATED AREAS]
5. Respirable Crystalline Silica Exposure Monitoring – Sampling and Analysis Methodology and Good Industrial Hygiene Technique

NIOSH Method 7500 is the preferred sampling and analysis procedure. Typically, air samples for respirable crystalline silica are obtained on pre-weighed 37-millimeter (mm), Polyvinyl Chloride (PVC) filters. Using pre-weighed filters allows for analysis of total respirable dust as well as RCS. This method allows the use of an aluminum cyclone (calibrated to 2.5 liters per minute), a nylon cyclone (calibrated to 1.7 L/min) or a Higgins-Dewell cyclone (calibrated to 2.2 L/min). The cyclone is attached at the air inlet to separate the respirable fraction of dust from the total dust.

Analysis of the samples are by X-ray Diffraction and quantify separately each species of crystalline silica: Quartz, Cristobalite and Tridymite. Tridymite and cristobalite are rarely present relative to quartz, so if you are certain, based on SDS review or otherwise, that neither of these are not present, it is not necessary to analyze for them. Always use an analytical laboratory accredited by the American Industrial Hygiene Association for all RCS sample analysis.

Use the following guidelines when conducting air monitoring in the work environment.

1. Always conduct personal air monitoring to assess inhalation potential exposure to RCS. Area/stationary samples can be useful in certain situations, but decision making on exposure controls should be made based upon personal exposure monitoring.

2. Sample for as many workers present as possible. Industrial hygiene monitoring can be highly variable due to individual work practices and variability in local, turbulent air flows. More samples provide a better idea of average exposure levels. If there are more workers present than available air sampling pumps, select the workers most likely to be exposed to the highest RCS concentrations.

3. The sampling train consists of a personal air sampling pump, tygon tubing connecting the pump to the filter cassette and the cyclone attached to the air inlet to the filter cassette.

4. This sampling train is calibrated before sampling begins with the filter cassette and cyclone in line. Always use a primary flow calibrator such as a BIOS Defender Air Flow Calibrator, Gilibrator or Buck Calibrator. **The use of rotameters is not considered a “primary” air flow calibrator.

5. At the beginning of work operations, the personal sampling pump is attached to the belt of each worker and the filter cassette assembly is attached at the collar within 9 inches of the worker’s breathing zone. Once positioned properly, the pump is turned on, the time is noted and sampling starts.
6. To verify performance, the sampling pumps should be checked at regular intervals and during employee breaks.

7. Observations of the work activities should be made throughout the monitoring period with detailed notes taken regarding visible dust, work practices, equipment used and exposure control measures.

8. Always try to sample for the full shift (typically 8 hours). If the worker(s) cease conducting work that might expose them to RCS, the sampling can be stopped. However, in order to achieve sufficient volumes, at least 4 hours of sampling should be conducted.

9. At the end of the shift or sampling period, the sampling media is removed, being careful to keep the cyclone upright to avoid non-respirable dust captured by the cyclone from falling onto the PVC filter.

10. The sampling pump flow rate must be post-calibrated with the primary flow rate calibrator and documented along with the final time and volume. This information should be entered onto the laboratory Chain of Custody form. Each filter cassette should be secured by inserting the supplied plastic port plugs and sealed in sample submittal bags.

11. A field blank filter should be submitted to the laboratory for each day of sampling. A field blank is simply a filter cassette that is opened in the work environment, but no air is passed through it.
6. Additional Silica Resources

- OSHA 3697 Abrasive Blasting Fact Sheet
- OSHA Silica Rule Table 1 Tasks
- OSHA 3681 Silica Fact Sheet
- Silica Safety Talk
Protecting Workers from the Hazards of Abrasive Blasting Materials

Abrasive blasting uses compressed air or water to direct a high velocity stream of an abrasive material to clean an object or surface, remove burrs, apply a texture, or prepare a surface for the application of paint or other type of coating. Employers must protect workers from hazardous dust levels and toxic metals that may be generated from both the blasting material and the underlying substrate and coatings being blasted. This fact sheet provides information on abrasive blasting material, health hazards, and methods to protect workers.

**Abrasive Blasting Materials**

The decision to use a certain type of abrasive material can depend on factors such as cost, job specifications, environment, and worker health.

Commonly used abrasive materials:
- Silica sand (crystalline)
- Coal slag
- Garnet sand
- Nickel slag
- Copper slag
- Glass (beads or crushed)
- Steel shot
- Steel grit
- Specular hematite (iron ore)

Alternative, less toxic blasting materials include:
- Ice cubes
- Dry ice
- Plastic bead media
- Sponge
- Sodium bicarbonate (baking soda)

- Ground walnut shells, ground corn cob and other biodegradable materials
- High pressure water

**** CAUTION ****

Abrasive blasting creates high levels of noise that can cause substantial hearing loss. Always wear hearing protection. Employers must administer a hearing conservation program as required by the OSHA Occupational Noise standard.

**Health Hazards**

Abrasive blasting operations can create high levels of dust and noise. Abrasive material and the surface being blasted may contain toxic materials (e.g., lead paint, silica) that are hazardous to workers.

- Silica sand (crystalline) can cause silicosis, lung cancer, and breathing problems in exposed workers.
- Coal slag and garnet sand may cause lung damage similar to silica sand (based on preliminary animal testing).
- Copper slag, nickel slag, and glass (crushed or beads) also have the potential to cause lung damage.
- Steel grit and shot have less potential to cause lung damage.
- Slags can contain trace amounts of toxic metals such as arsenic, beryllium, and cadmium.
How to Protect Workers from Exposure to Abrasive Blasting Materials

Each abrasive blasting operation is unique, involving different surfaces, coatings, blast material, and working conditions. Before beginning work, employers should identify the hazards and assign a knowledgeable person trained to recognize hazards and with the authority to quickly take corrective action to eliminate them. Use engineering and administrative controls, personal protective equipment (PPE), including respiratory protection, and training to protect workers involved in abrasive blasting activities.

Engineering controls, such as substitution, isolation, containment, and ventilation are the primary means of preventing or reducing exposures to airborne hazards during abrasive blasting operations. Administrative controls, including the use of good work and personal hygiene practices, can also reduce exposure. When engineering and administrative controls cannot keep exposures to hazardous materials below OSHA permissible exposure limits, respiratory protection must be used.

Engineering Controls

1. Substitution
   - Use a less toxic abrasive blasting material.
   - Use abrasives that can be delivered with water (slurry) to reduce dust.

2. Isolation and Containment
   - Use barriers and curtain walls to isolate the blasting operation from other workers.
   - Use blast rooms or blast cabinets for smaller operations.
   - Use restricted areas for non-enclosed blasting operations.
   - Keep coworkers away from the blaster.

3. Ventilation
   - Use exhaust ventilation systems in containment structures to capture dust.

Administrative Controls

Perform routine cleanup using wet methods or HEPA filtered vacuuming to minimize the accumulation of toxic dusts.

- Do not use compressed air to clean as this will create dust in the air.
- Clean and decontaminate tarps and other equipment on the worksite.
- Schedule blasting when the least number of workers are at the site.
- Avoid blasting in windy conditions to prevent the spread of any hazardous materials.

Personal Hygiene Practices

- Prohibit eating, drinking, or using tobacco products in blasting areas.
- Provide wash stations so workers can wash their hands and face routinely and before eating, drinking, or smoking.
- Vacuum or remove contaminated work clothes before eating, drinking or smoking.
• Provide accommodations for end-of-shift showers and change areas with separate storage facilities for street clothes, protective clothing and equipment.
• Keep contaminated clothing and equipment out of the clean change area.

Respiratory Protection
An abrasive-blasting respirator must cover the wearer’s head, neck, and shoulders to protect the wearer from rebounding abrasive. Workers must use only respirators approved by NIOSH to provide protection from dusts produced during abrasive-blasting operations.

• Type CE NIOSH-certified blasting airline respirator with positive pressure blasting helmet.

Support personnel involved in cleanup and other related activities may also need respiratory protection.

When respirators are used, employers must establish a comprehensive respiratory protection program as required by the OSHA Respiratory Protection standard (29 CFR 1910.134).

Personal Protective Equipment
• Hearing protection
• Eye and face protection
• Helmet
• Leather gloves that protect to full forearm and aprons (or coveralls)
• Safety shoes or boots

Worker Training and Hazard Communication
• Provide training to abrasive blasters and support personnel on blasting health and safety hazards, how to use controls, personal hygiene practices, safe work practices and the use of PPE and respirators.
• Manufacturers are required to include appropriate health hazard information on the blasting materials on safety data sheets (SDS) as required under OSHA’s Hazard Communication standard (29 CFR 1910.1200).
• Obtain and read the manufacturer’s SDS for health hazard information on the abrasive blasting material you are using.

For more information on abrasive blasting and control measures see: OSHA’s guidance document: “Abrasive Blasting Hazards in Shipyard Employment” (2006); and eTool: Mechanical Removers (Ship Repair).
**Applicable OSHA Standards and Safety and Health Topic Pages**

The following table provides links to several OSHA standards (not all-inclusive) that may contain requirements that apply to abrasive blasting operations. For example, the removal of lead paint by abrasive blasting will likely require employers to follow provisions of the OSHA Lead standard. Safety and health topic pages listed here provide employers and workers with information that may be useful for safely conducting abrasive blasting.

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<td>See 1910.1000, Table Z-1 for air contaminants</td>
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### Table 1: Specified Exposure Control Methods When Working With Materials Containing Crystalline Silica

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<th>Required Respiratory Protection</th>
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<tr>
<td><strong>1</strong> Stationary masonry saws</td>
<td>• Use saw equipped with integrated water delivery system that continuously feeds water to the blade. &lt;br&gt; • Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions.</td>
<td>≤ 4 hours/shift: None  &gt;4 hours/shift: None</td>
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<tr>
<td><strong>2a</strong> Handheld power saws (any blade diameter) when used outdoors</td>
<td>• Use saw equipped with integrated water delivery system that continuously feeds water to the blade. &lt;br&gt; • Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions.</td>
<td>≤ 4 hours/shift: None  &gt;4 hours/shift: N95 (or Greater Efficiency) Filtering Facepiece or Half Mask</td>
</tr>
<tr>
<td><strong>2b</strong> Handheld power saws (any blade diameter) when used indoors or in an enclosed area</td>
<td>• Use saw equipped with integrated water delivery system that continuously feeds water to the blade. &lt;br&gt; • Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions.</td>
<td>≤ 4 hours/shift: N95 (or Greater Efficiency) Filtering Facepiece or Half Mask  &gt;4 hours/shift: N95 (or Greater Efficiency) Filtering Facepiece or Half Mask</td>
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<tr>
<td><strong>3</strong> Handheld power saws for cutting fiber-cement board (with blade diameter of 8 inches or less) for tasks performed outdoors only</td>
<td>• Use saw equipped with commercially available dust collection system. &lt;br&gt; • Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions. &lt;br&gt; • Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency.</td>
<td>≤ 4 hours/shift: None  &gt;4 hours/shift: None</td>
</tr>
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<td><strong>4a</strong> Walk-behind saws when used outdoors</td>
<td>• Use saw equipped with integrated water delivery system that continuously feeds water to the blade. &lt;br&gt; • Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions.</td>
<td>≤ 4 hours/shift: None  &gt;4 hours/shift: None</td>
</tr>
<tr>
<td><strong>4b</strong> Walk-behind saws when used indoors or in an enclosed area</td>
<td>• Use saw equipped with integrated water delivery system that continuously feeds water to the blade. &lt;br&gt; • Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions.</td>
<td>≤ 4 hours/shift: N95 (or Greater Efficiency) Filtering Facepiece or Half Mask  &gt;4 hours/shift: N95 (or Greater Efficiency) Filtering Facepiece or Half Mask</td>
</tr>
<tr>
<td><strong>5</strong> Drivable saws for tasks performed outdoors only</td>
<td>• Use saw equipped with integrated water delivery system that continuously feeds water to the blade. &lt;br&gt; • Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions.</td>
<td>≤ 4 hours/shift: None  &gt;4 hours/shift: None</td>
</tr>
<tr>
<td>Construction Task or Equipment Operation</td>
<td>Engineering and Work Practice Control Methods</td>
<td>Required Respiratory Protection</td>
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</table>
| 6                                       | • Use tool equipped with integrated water delivery system that supplies water to cutting surface.  
• Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions. | ≤ 4 hours/shift  
>4 hours/shift |
| Rig-mounted core saws or drills          |                                               | None  
None |
| 7                                       | • Use drill equipped with commercially available shroud or cowling with dust collection system.  
• 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 cleaning holes. | ≤ 4 hours/shift  
>4 hours/shift |
| Handheld and stand-mounted drills (including impact and rotary hammer drills) |                                               | None  
None |
| 8                                       | • 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 cleaning holes. | ≤ 4 hours/shift  
>4 hours/shift |
| Dowel drilling rigs for concrete for tasks performed outdoors only |                                               | N95 (or Greater Efficiency) Filtering Facepiece or Half Mask  
N95 (or Greater Efficiency) Filtering Facepiece or Half Mask |
| 9a                                      | • 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. | ≤ 4 hours/shift  
>4 hours/shift |
| Vehicle-mounted drilling rigs for rock and concrete |                                               | None  
None |
| 9b                                      | • Operate from within an enclosed cab and use water for dust suppression on drill bit. | ≤ 4 hours/shift  
>4 hours/shift |
| Vehicle-mounted drilling rigs for rock and concrete |                                               | None  
None |
| 10a                                     | • Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact. | ≤ 4 hours/shift  
>4 hours/shift |
| Jackhammers and handheld powered chipping tools when used outdoors |                                               | None  
N95 (or Greater Efficiency) Filtering Facepiece or Half Mask  
N95 (or Greater Efficiency) Filtering Facepiece or Half Mask |
| 10b                                     | • Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact. | ≤ 4 hours/shift  
>4 hours/shift |
| Jackhammers and handheld powered chipping tools when used indoors or in an enclosed area |                                               | N95 (or Greater Efficiency) Filtering Facepiece or Half Mask  
N95 (or Greater Efficiency) Filtering Facepiece or Half Mask |
| 10c                                     | • 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. | ≤ 4 hours/shift  
>4 hours/shift |
| Jackhammers and handheld powered chipping tools when used outdoors |                                               | None  
N95 (or Greater Efficiency) Filtering Facepiece or Half Mask  
N95 (or Greater Efficiency) Filtering Facepiece or Half Mask |
<table>
<thead>
<tr>
<th>Construction Task or Equipment Operation</th>
<th>Engineering and Work Practice Control Methods</th>
<th>Required Respiratory Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>10d Jackhammers and handheld powered chipping tools when used indoors or in an enclosed area</td>
<td>- 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.</td>
<td>≤ 4 hours/shift</td>
</tr>
<tr>
<td>11c Handheld grinders for uses other than mortar removal when used outdoors or in an enclosed area</td>
<td>- Use grinder equipped with commercially available shroud and dust collection system. - Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions. - Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism.</td>
<td>None</td>
</tr>
<tr>
<td>12b Handheld grinders for uses other than mortar removal when used outdoors</td>
<td>- Use grinder equipped with commercially available shroud and dust collection system. - Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions. - Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism.</td>
<td>None</td>
</tr>
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<td>12c Handheld grinders for uses other than mortar removal when used indoors or in an enclosed area</td>
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<td>None</td>
</tr>
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<td>Construction Task or Equipment Operation</td>
<td>Engineering and Work Practice Control Methods</td>
<td>Required Respiratory Protection</td>
</tr>
<tr>
<td>-----------------------------------------</td>
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<td>Required Respiratory Protection</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>----------------------------------------------</td>
<td>---------------------------------</td>
</tr>
</tbody>
</table>
| 13a Walk-behind milling machines and floor grinders | • Use machine equipped with integrated water delivery system that continuously feeds water to the cutting surface.  
• Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions. | ≤ 4 hours/shift | None  
>4 hours/shift | None |
| 13b Walk-behind milling machines and floor grinders | • Use machine equipped with dust collection system recommended by the manufacturer.  
• Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions.  
• Dust collector must provide the air flow recommended by the manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism.  
• When used indoors or in an enclosed area, use a HEPA-filtered vacuum to remove loose dust in between passes. | ≤ 4 hours/shift | None  
>4 hours/shift | None |
| 14 Small drivable milling machines (less than half-lane) | • Use a machine equipped with supplemental water sprays designed to suppress dust.  
• Water must be combined with a surfactant.  
• Operate and maintain machine to minimize dust emissions. | ≤ 4 hours/shift | None  
>4 hours/shift | None |
| 15a Large drivable milling machines (half-lane and larger) for cuts of any depth on asphalt only | • Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust.  
• Operate and maintain machine to minimize dust emissions. | ≤ 4 hours/shift | None  
>4 hours/shift | None |
| 15b Large drivable milling machines (half-lane and larger) for cuts of four inches in depth or less on any substrate | • Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust.  
• Operate and maintain machine to minimize dust emissions. | ≤ 4 hours/shift | None  
>4 hours/shift | None |
| 15c Large drivable milling machines (half-lane and larger) for cuts of four inches in depth or less on any substrate | • Use a machine equipped with supplemental water spray designed to suppress dust.  
• Water must be combined with a surfactant.  
• Operate and maintain machine to minimize dust emissions. | ≤ 4 hours/shift | None  
>4 hours/shift | None |
| 16 Crushing machines | • Use equipment designed to deliver water spray or mist for dust suppression at crusher and other points where dust is generated (e.g., hoppers, conveyers, sieves/sizing or vibrating components, and discharge points).  
• Operate and maintain machine in accordance with manufacturer’s instructions to minimize dust emissions.  
• Use a ventilated booth that provides fresh, climate-controlled air to the operator, or a remote-control station. | ≤ 4 hours/shift | None  
>4 hours/shift | None |
<table>
<thead>
<tr>
<th>Construction Task or Equipment Operation</th>
<th>Engineering and Work Practice Control Methods</th>
<th>Required Respiratory Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>≤ 4 hours/shift</td>
</tr>
<tr>
<td>17a</td>
<td>Heavy equipment and utility vehicles used to abrade or fracture silica-containing materials (e.g., hoe-ramming, rock ripping) or used during demolition activities involving silica-containing materials</td>
<td>• Operate equipment from within an enclosed cab.</td>
</tr>
<tr>
<td>17b</td>
<td>Heavy equipment and utility vehicles used to abrade or fracture silica-containing materials (e.g., hoe-ramming, rock ripping) or used during demolition activities involving silica-containing materials</td>
<td>• When employees outside of the cab are engaged in the task, apply water and/or dust suppressants as necessary to minimize dust emissions.</td>
</tr>
<tr>
<td>18a</td>
<td>Heavy equipment and utility vehicles for tasks such as grading and excavating but not including demolishing, abrading, or fracturing silica-containing materials</td>
<td>• Apply water and/or dust suppressants as necessary to minimize dust emissions.</td>
</tr>
<tr>
<td>18b</td>
<td>Heavy equipment and utility vehicles for tasks such as grading and excavating but not including demolishing, abrading, or fracturing silica-containing materials</td>
<td>• When the equipment operator is the only employee engaged in the task, operate equipment from within an enclosed cab.</td>
</tr>
</tbody>
</table>

When implementing the control measures specified in Table 1, shall:

- For tasks performed indoors or in enclosed areas, provide a means of exhaust as needed to minimize the accumulation of visible airborne dust;

- For tasks performed using wet methods, apply water at flow rates sufficient to minimize release of visible dust;
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.

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>
<thead>
<tr>
<th>Equipment/Task</th>
<th>Engineering and Work Practice Control Methods</th>
<th>Required Respiratory Protection and Minimum Assigned Protection Factor (APF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ii) Handheld power saws (any blade diameter)</td>
<td>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.</td>
<td>≤ 4 hrs/shift</td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>APF 10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>APF 10</td>
</tr>
</tbody>
</table>

Excerpt from Table 1.

*See regulatory text for construction standard, with complete Table 1 at [www.osha.gov/silica/SilicaConstructionRegText.pdf](http://www.osha.gov/silica/SilicaConstructionRegText.pdf).

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 in 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](http://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.

OSHA’s On-site Consultation Program offers free and confidential occupational safety and health services to small and medium-sized businesses in all states and several territories across the country, with priority given to high-hazard worksites. On-site consultation services are separate from enforcement and do not result in penalties or citations. Consultants from state agencies or universities work with employers to identify
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.

For more information on this and other health-related issues impacting workers, to report an emergency, fatality, inpatient hospitalization, or to file a confidential complaint, contact your nearest OSHA office, visit www.osha.gov, or call OSHA at 1-800-321-OSHA (6742), TTY 1-877-889-5627.

This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory-impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.

For assistance, contact us. We can help. It's confidential.

www.osha.gov (800) 321-OSHA (6742)

DSG FS-3681 03/2016
INTRODUCTION
Silica (SiO2) are very jagged micro-sized crystallized glass type shards (Quartz, Cristobalite, Tridymite) and are the most common element on the Earth’s surface. SiO2 is extremely dangerous to the lungs, and it is eventually fatal to humans upon continued, extended, uncontrolled ingestion. It is created by taking sand and adding heat to form glass.

Silica dust is generated from cutting, grinding, drilling, sanding, sandblasting or abrasive blasting on concrete, bricks or masonry blocks. If the blasting grit contains silica, it will usually be labeled as silica sand or as containing quartz or crystalline silica.

A lung disease called “silicosis” is caused by breathing in dust containing silica. The dust causes “fibrosis” (or scar tissue formation) in the lungs. This reduces the lung’s ability to extract oxygen from the air. The effects of silica are irreversible. As such, silica is considered a serious hazard on many construction sites.

“Chronic silicosis is the more common health effect. Acute silicosis occurs after exposure to massive amounts of silica dust. Although rare, workers in their 30’s and 40’s who didn’t know they were working with silica and didn’t wear respirators have died by suffocation within months of exposure to extremely heavy silica dust concentrations. Their lungs were so badly scarred they couldn’t get enough oxygen.”
SAFETY TALK

SILICA (PART 2 of 3)

SILICA PEL
The safety amount of silica in the air is zero. The legal limit is called a “Permissible Exposure Limit” or PEL. The PEL for SiO2 in the air is 50 micrograms per cubic meter. This limit is for respirable (fine) dust.

Rule-of-thumb: if dust containing silica is visible in the air, it’s almost always over the permissible limit.

This limit is based on an 8-hour average exposure and is very low, because it doesn’t take much silica in the air to cause health problems.

Imagine an extremely tiny pinch of very fine dust dispersed in the air in a 3 square foot square box - you probably couldn’t even see it. Respirable dust is that fine dust that is inhaled deep into the lungs where it causes damage. Coarse dust is caught in the nose and throat before reaching the lungs.

WHERE IS SILICA FOUND ON MY JOB?

Abrasive blasting with silica sand creates extremely high levels of silica dust. Abrasive blasting on concrete with any kind of grit produces high levels of silica dust. Sandblasting concrete (even without silica sand) still results in high levels of silica in the air from the concrete itself.

Other trades/tasks that generate exposures exceeding the PEL include:
- Drywall finishing
- Sanding painted surfaces containing SiO2
- Concrete and masonry building construction
- Earthwork and rock crushing
- Masonry or concrete building construction
- Road construction and repair

In many construction jobs, we have short but high exposures to silica. Every time you inhale silica dust, it’s like inhaling fine, broken glass that scar your lungs. It adds up over time.

This safety talk was developed by Safety Controls Technology (SCT)
The material in this document is provided for informational purposes only and not as a comprehensive or exhaustive resource on this topic. This material has been compiled from a multitude of sources believed to be accurate; however SCT and FCA assume no responsibility for the accuracy or currency of this information and encourage you to consult experts in this area for more information. In no event does the content of this document supersede any applicable local, state or federal statues or regulations.
CONTROLLING SILICA EXPOSURES

When dust is controlled, exposures are low. When dust is uncontrolled, exposures are high. Many exposures are for short time periods but at very high concentrations. Short, high exposures can still excited permissible limits and cause lung damage.

Silica dust exposure can be controlled by use of water or exhaust ventilation. Using water for dust suppression is usually the most effective way of controlling silica dust. If inadequate amounts of water are used, operators of concrete cutters can still be exposed to too much silica dust. The amount often suggested is a pint of water per minute for best dust control. Too much water can create a disposal or cleanup problem and sometimes soak the operator.

The vacuum must have HEPA (high efficiency) filters to completely capture the fine dust.

New abrasive blasting equipment using water has recently been developed, but the levels of silica in the air will still probably exceed the allowable limit. Acid washing is sometimes used to prepare concrete flooring rather than sandblasting.

Avoid dry sweeping and use of compressed air on concrete. Both these activities can stir up large amounts of dust. Use a vacuum with high efficiency filters when possible. When these activities cannot be avoided, respirators must be worn.

Respirators may still be needed even when steps have been taken to reduce the amount of dust in the air.

Sometimes, it can be difficult to reduce the amount of silica dust to levels below the permissible limits. A supplied air respirator may be needed for high levels of silica dust where water or ventilation can’t be used to control the dust. A supplied air respirator is required if the amount of silica in the air is more than 10 times the permissible limit.