

**University of Delaware**  
**Respirable Crystalline Silica Dust Program**  
**June 2018**

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## 1. Introduction

It is the policy of University of Delaware to take precautions to eliminate potential hazards in the workplace. The purpose of the Respirable Crystalline Silica Program is to provide information regarding the hazards associated with respirable crystalline silica dust (RCS), to identify activities with the potential to generate dangerous levels of RCS, and to establish procedures to minimize exposure in accordance with OSHA standards 29 CFR 1910.1053(l) for general industry..

Crystalline silica is a basic component of soil, sand, granite and many other common minerals. Quartz is the most common form of crystalline silica. All materials containing silica can generate respirable silica particles during chipping, cutting, drilling, grinding, and other construction and maintenance activities. Silica enters the body through inhalation of fine silica particulate matter. Exposure to excessive silica dust over long periods can result in silicosis. The most severe silica exposures usually occur during abrasive blasting with sand to remove paint and rust from steel and concrete surfaces. Other activities on or off campus that may result in severe silica exposure include jack hammering, rock drilling, concrete mixing, concrete drilling, brick and concrete cutting and sawing, and brick pointing.

This Respirable Crystalline Silica Safety Program applies to University of Delaware employees who have the potential to be exposed to silica dust through the methods outlined above; or through other means, which are determined by EHS or their supervisor.

## 2. Responsibilities

### 2.1. Environmental Health & Safety (EHS)

2.1.1. Provides program oversight and consultation to University of Delaware work groups regarding potential risks, exposure prevention and training relating to silica dust exposures.

2.1.2. Review and recommend silica dust control and remediation tools and techniques.

2.1.3. Conduct building/material assessments for silica-containing materials and coordinate silica hazard assessments and monitoring upon request.

2.1.4. Perform annual evaluation of the program

2.1.5. Provide Silica Awareness Training for employees.

### 2.2. Facilities, Real Estate and Auxiliary Services (FREAS) and other affected Departments

2.2.1. Ensures the applicable components of the Respirable Crystalline Silica Safety Program are available to all affected employees.

2.2.2. Obtain and ensure proper use of dust control and remediation tools and techniques.

2.2.3. Assures that the Silica Awareness training is given to employees expected to work in, or with, building materials where there is a potential risk for silica exposure.

### 2.3. Supervisors

2.3.1. Employees who supervise personnel with responsibilities to work in areas where there is a risk of exposure to silica dust must ensure employees are properly trained on the applicable contents of the Respirable Crystalline Silica Safety Program and are provided

appropriate tools and personal protective equipment (PPE) when needed.

#### 2.4. Authorized Person

2.4.1. Employees working in areas where there is an identified risk of silica dust exposure must be properly trained on all appropriate dust control tools and all applicable elements of the Respirable Crystalline Silica Safety Program and be provided with and utilize the appropriate PPE for the task being performed.

### 3. Definitions

3.1. The following definitions are used in the Respirable Crystalline Silica Safety Program.

Action level	A concentration of airborne respirable crystalline silica dust of $25 \mu\text{g}/\text{m}^3$ , calculated as an 8-hour threshold weighted average (TWA).
Authorized person:	An employee who has received proper training and exposure monitoring and can safely work with silica-containing materials.
Crystalline silica:	Silicon dioxide that assumes a regular crystalline pattern at the molecular level. Quartz is the most common form of crystalline silica. It is a naturally occurring component in earth soils, sand, granite and many other minerals resulting in many building materials containing silica.
HEPA Filter:	High Efficiency Particulate Air Filter; a filtering system capable of trapping and retaining at least 99.97% of all particles of 0.3 micron in diameter and larger.
Permissible Exposure Limit (PEL):	The OSHA limit for crystalline silica dust exposure. It is set at $50 \mu\text{g}/\text{m}^3$ , averaged over an 8-hour workday, calculated as a threshold weighted average (TWA).
Silica-containing material:	Any material that has the potential to contain crystalline silica at levels that may pose a hazard to employees when the material creates airborne particles
Silicosis:	A lung disease caused by inhalation of silica dust. Silica dust can cause fluid buildup and scar tissue in the lungs that reduces the ability for the lungs to fully function.

### 4. Potential exposure

4.1. Employees might be exposed to respirable crystalline silica (RCS) when conducting activities such as:

- Abrasive blasting
- Jack hammering
- Rock drilling
- Mixing of concrete or grout
- Chipping or scarifying concrete
- Moving or dumping piles of concrete, rock or sand

- Demolition of concrete or brick
- Using coatings containing silica
- Removing coatings containing silica
- Concrete drilling
- Sawing concrete or bricks

4.2. If RCS is suspected to be generated at or near PELs while performing work, the University will adhere to the exposure control methods of Table 1 of the Respirable Silica Regulation (CFR 1926.1153 Appendix I) and outlined in the University's Exposure Control Plans in Appendix A of this document.

4.3. FREAS will avoid the use crystalline silica-containing products whenever practical. No RCS exposure controls are needed when working with non-crystalline silica containing materials.

4.3.1. Environmental Health & Safety or an authorized contractor can perform building material assessments to determine silica content in materials.

4.4. The University has determined that objective data shows that gypsum-based drywall does not contain appreciable levels of RCS and thus no special exposure controls are required to work with or clean up after.

## 5. Exposure Monitoring

5.1. Most normal maintenance and tasks performed by FREAS are expected to have no RSC exposure potential above the Action Level as long as the engineering controls of Table 1 of the Respirable Silica Regulation (CFR 1926.1153 Appendix I) and the University's Exposure Control plans are followed.

5.2. If the engineering controls of Table 1 of the Respirable Silica Regulation (CFR 1926.1153 Appendix I) cannot be implemented for a specific task, the University shall follow the PEL and Exposure Assessment requirements of CFR 1926.1153 Paragraph (D).

## 6. Exposure Control

### 6.1. Administrative/Engineering Controls

6.1.1. The appropriate engineering or administrative controls, as detailed in Table 1 of the Respirable Crystalline Silica Regulation, will be implemented whenever feasible. No follow-up exposure monitoring will be necessary as long as the specified administrative or engineering exposure controls are utilized.

6.1.2. Typical controls may involve:

- Substituting non-silica-containing materials for use while abrasive blasting
- Alternative methods such as using pre-mixed grout or concrete instead of on-site mixing
- Local exhaust ventilation
- General ventilation
- Limit worker access to high exposure areas
- Vacuum methods with HEPA filters
- Distancing workers from the silica dust point source
- Dust control products
- Containment
- Use of water to capture dust as it is generated

- Limiting time of exposure to silica dust
- General work practices such as good housekeeping and development of specific SOPs to minimize exposure

## 6.2. Personal Protective Equipment (PPE)

6.2.1. In addition to any respirators required by the job-specific exposure control plan, workers must also wear safety glasses or goggles, work gloves, safety shoes, and any other PPE as determined by the supervisor while working with silica-containing material. Workers are not required to, but may voluntarily, wear disposal coveralls and/or disposable dust masks.

**NOTE:** *Employees utilizing a respirator must adhere to the policies outlined in the University's Respiratory Protection Program.*

6.3. Written Exposure Control Plan – Supervisors may consult with EHS to develop and implement a written exposure control plan that contains the following:

6.3.1. A description of the tasks in the workplace that involve exposure to respirable crystalline silica.

6.3.2. A description of the engineering controls, work practices, and respiratory protection used to limit employee exposure to silica.

6.3.3. A description of the housekeeping measures used to limit exposure to silica.

**NOTE:** *Appendix A of this document includes Exposure Control plans for most tasks University Maintenance and Operations employees are anticipated to perform.*

## 7. Housekeeping & Hygiene Facilities

7.1. In areas where crystalline silica-containing dust may be present, all surfaces must be maintained free from accumulations of dust to minimize potential silica exposure. Dust and other silica-containing debris should be removed from the work area when the task is completed but no later than at the end of the work shift.

7.2. Proper use of engineering controls should not leave silica dust on the clothing or feet of workers. In the event that silica dust settles on clothing and/or shoes, it is to be removed by HEPA-filter vacuuming before leaving the work area.

7.3. Silica dust removal from surrounding surfaces is limited the use of a HEPA-filter vacuum or wet methods such as wet mopping.

7.4. Unacceptable methods of silica dust removal include dry sweeping, vacuums without HEPA-filters, and blowing with compressed air.

7.5. Workers must wash hands after leaving the work area. OSHA recommends that workers also shower prior to leaving work.

## 8. Medical Surveillance

8.1. The University does not expect that any employee shall need to perform tasks that require the wearing of a respirator due to potential silica exposure for more than 29 days in any 12-month period. Should an employee need to wear a respirator due to potential silica exposure for 30 or more days, they will be offered medical surveillance as described in Appendix B of the OSHA Respirable Crystalline Silica standard for General Industry. Medical surveillance will be provided



at no cost to the employee.

- 8.2. Any employee that is required to wear a respirator due to potential exposure to respirable silica dust must be enrolled in the University's respirator medical monitoring program before donning a respirator.

## **9. Training and Recordkeeping**

- 9.1. Silica Awareness Training will be offered to affected employees prior to working with silica and annually thereafter.

9.1.1. Silica awareness training will include the following:

- Information about the potential health effects and symptoms of exposure to respirable silica.
- Safety data sheets for silica, quartz, and applicable products containing silica
- The purpose and set up of regulated areas to mark the boundaries of work areas containing silica dust
- The use of engineering controls, work practices, good housekeeping and PPE to control exposure to silica
- Use and care of PPE
- Expected exposures to silica dust
- Exposure monitoring process
- Medical surveillance process

- 9.2. Respiratory protection training, medical clearance, and quantitative fit testing is required under the Respiratory Protection Program. Contact EHS for additional information regarding enrollment in the program.

- 9.3. Supervisors will assure that all workers are trained in proper use of dust controls and have taken the required Silica Awareness training prior to performing tasks that could generate RCS.

- 9.4. EHS will maintain all training, medical surveillance, and exposure monitoring results.

## **10. Access control**

- 10.1. Supervisors shall designate work areas where crystalline silica dust is generated by maintenance or construction activities.

10.1.1. Only workers directly involved with the maintenance or construction activities shall be allowed in the designated area until all dust generation has ended and the area has been cleaned.

10.1.2. Designated areas shall be cordoned off with high-visibility warning tape and or other barricading methods.



## **11. Appendix A- Exposure Control Plans**



**Material**  
Concrete

**Task**  
Cutting/sawing

**Equipment and Control(s)**  
Hand-Held Angle Grinder with Vacuum

**Corresponding Table 1 Equipment/Task**  
xii

**Task/Control Description**

Cutting openings in concrete walls. Typically, less than 4 hours of exposure per shift.

Use grinder with commercially available shroud and dust control system.

Operate grinder in accordance with manufacturer's instructions to minimize dust emissions.

Dust collector must provide a minimum of 25 cubic feet per minute of airflow per inch of wheel diameter and have a filter with 99% or greater capture efficiency.

No respiratory protection if used outdoors. No respiratory protection in used indoors for no more than 4 hours per shift. Level APF 10 protection required if used indoors for more than 4 hours per shift. NOTE: Respirator users must be fitted and tested by EHS.

Limit access to area to necessary personnel only.



**Material**  
Concrete

**Task**  
Drilling/coring

**Equipment and Control(s)**  
1) Hand-Held Drill with Dust Extraction,  
2) Hand-Held Drill with Vacuum

**Corresponding Table 1 Equipment/Task**  
vii

**Task/Control Description**

Drilling holes in concrete walls. Typically, less than 4 hours of exposure per day.

Use drill with commercially available shroud or cowling with dust control system.

Operate grinder in accordance with manufacturer's instructions to minimize dust emissions.

Dust collector must provide the airflow recommended by the drill manufacturer and have a filter with 99% or greater capture efficiency.

Use a HEPA-filtered vacuum when cleaning holes.

No respiratory protection required.

Limit access to area to necessary personnel only.





**Material**  
Concrete

**Task**  
Sweeping/cleaning up

**Equipment and Control(s)**  
1) Vacuum,  
2) Water - Wet Surface

**Task/Control Description**

Clean up of any dust created during silica generating tasks. Typically, less than 4 hours of exposure per shift.

Removal of all dust generated by silica generating tasks shall be done through either vacuuming with a HEPA-filtered vacuum or wet mopping.

Limit access to area to necessary personnel only until cleaning operations are complete.



## Material

Concrete Block

## Task

Cutting/sawing

## Equipment and Control(s)

Hand-Held Masonry Saw with Water

## Corresponding Table 1 Equipment/Task

ii

## Task/Control Description

Cutting openings in concrete walls. Typically, less than 4 hours of exposure per shift.

Use saw equipped with integrated water delivery system that continuously feeds water to the saw blade.

Operate saw in accordance with manufacturer's instructions to minimize dust emissions.

No respiratory protection if used outdoors for less than 4 hours per shift. Level APF 10 protection required if used outdoors for more than 4 hours per shift or indoors for any length of time. NOTE: Respirator users must be fitted and tested by EHS.

Limit access to area to necessary personnel only.



## Material

Concrete Block

## Task

Drilling/coring

## Equipment and Control(s)

- 1) Hand-Held Drill with Dust Extraction,
- 2) Hand-Held Drill with Vacuum

## Corresponding Table 1 Equipment/Task

vii

## Task/Control Description

Drilling holes in concrete block walls. Typically, less than 4 hours of exposure per day.

Use drill with commercially available shroud or cowling with dust control system.

Operate drill in accordance with manufacturer's instructions to minimize dust emissions.

Dust collector must provide the airflow recommended by the drill manufacturer and have a filter with 99% or greater capture efficiency.

Use a HEPA-filtered vacuum when cleaning holes.

No respiratory protection required.

Limit access to area to necessary personnel only.



## Material

Concrete Block

## Task

Sweeping/cleaning up

## Equipment and Control(s)

- 1) Vacuum,
- 2) Water - Wet Surface

## Task/Control Description

Clean up of any dust created during silica generating tasks. Typically, less than 4 hours of exposure per shift.

Removal of all dust generated by silica generating tasks shall be done through either vacuuming with a HEPA-filtered vacuum or wet mopping.

Limit access to area to necessary personnel only until cleaning operations are complete.





## Material

Mortar

## Task

Grinding

## Equipment and Control(s)

Handheld Grinder with Vacuum

## Corresponding Table 1 Equipment/Task

xi

## Task/Control Description

Handheld grinder for mortar removal prior to tuck pointing. Typically, less than 4 hours of exposure per shift.

Use grinder with commercially available shroud and dust control system. Operate grinder in accordance with manufacturer's instructions to minimize dust emissions.

Dust collector will provide a minimum of 25 cubic feet per minute of airflow per inch of wheel diameter and have a filter with 99% or greater capture efficiency.

Level APF 10 protection required for mortar removal activities of less than 4 hours per shift. Level APF 25 protection required for activities of more than 4 hours per shift. NOTE: Respirator users must be fitted and tested by EHS.

Limit access to area to necessary personnel only.

