

Silica in Construction Exposure Control Plan

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Applies To: Faculty, Staff, Students, Others

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Purpose

This exposure control plan has been developed to protect the health and safety of the University of Connecticut's employees, building occupants and visitors from potential exposure to crystalline silica and is in accordance with the Occupational Safety and Health Administration's (OSHA's) Silica in Construction Standard.

I. Scope

This program applies to all faculty, staff, and student employees at the Storrs, regional and Law School campuses.

II. Policy Statement

As stated in the University's Health and Safety Policy, the University of Connecticut is committed to providing a healthful and safe environment for all activities under its jurisdiction and complying with federal and state health and safety standards. As such, to minimize exposures to silica dust and to comply with OSHA's Silica in Construction standard, this Silica Exposure Control Plan shall be implemented at the University of Connecticut.

III. Enforcement

Violations of this plan may result in appropriate disciplinary measures in accordance with University Laws and By-laws, General Rules of Conduct for All University Employees, applicable collective bargaining agreements, and the University of Connecticut Student Code.

IV. Definitions

Action Level – a concentration of airborne respirable crystalline silica of 25 ug/m³, calculated as an 8-hour time-weighted average. Exceeding this requires compliance with the OSHA Standard and the University's Silica Exposure Control Plan.

Assigned Protection Factor (APF) – the workplace level of respiratory protection that a respirator or class of respirators is expected to provide to employees when the employer implements a continuing, effective respiratory protection program.

Competent Person – 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.

Contractor EHS Manual – the document that stipulates the University of Connecticut Environmental, Health, and Safety (EHS) Requirements for Construction, Service, and Maintenance Contractors. The document is available online at:

http://www.ehs.uconn.edu/ppp/Contractor_EHS_Manual.pdf.

Crystalline Silica – Silicon dioxide (SiO₂). Crystalline refers to the orientation of the SiO₂ molecules in a fixed pattern as opposed to a random molecular arrangement defined as amorphous. The three common crystalline forms of silica encountered are quartz, tridymite, and cristobalite.

Employee Exposure – the exposure to airborne respirable crystalline silica that would occur if the employee were not using a respirator.

Filtering Face-piece (dust mask) – a negative pressure particulate respirator with a filter as an integral part of the face-piece or with the entire face-piece composed of a filtering medium.

High Efficiency Particulate Air (HEPA) filter – a filter that is at least 99.97% efficient in removing mono-dispersed particles of 0.3 micrometers in diameter.

Permissible Exposure Limit (PEL) – a concentration of airborne respirable crystalline silica of 50 µg/m³, calculated as an 8-hour time-weighted average. Exceeding this requires respiratory protection, in addition to complying with all other aspects of the OSHA standard and the University's Silica Exposure Control Plan.

Physician or other Licensed Healthcare Profession (PLHCP) – an individual whose legally permitted scope of practice (i.e., license, registration or certification) allows him or her to independently provide or be delegated the responsibility to provide some or all of the particular health care services required.

Regulated Area – Areas where it is documented or reasonably anticipated to have exposures that exceed the permissible exposure limit. Respiratory protection is required in regulated areas.

Respirable crystalline silica – the portion of airborne crystalline silica (quartz, tridymite, and/or cristobalite) that is capable of entering the gas-exchange regions of the lungs if inhaled. Typically includes particles sizes of 10 µm or less.

V. Introduction

Crystalline silica (silicon dioxide, SiO₂) is a common mineral found in many naturally occurring and man-made materials used in building and hardscape construction. It is an important industrial material found abundantly in the earth's crust. There are three forms of silica: quartz, which is the most common, and cristobalite and tridymite. Quartz is a component of soil, sand, stone, rock,

concrete, brick, block, mortar, and plaster. Additionally, it can also be found in materials like paints, joint compound, drywall, ceiling tiles, ceramic tiles, and grout.

Respirable crystalline silica is very small particles, typically 100 times smaller than ordinary sand found at beaches or playgrounds. At this size the particles can enter the respiratory system and cause disease. Respirable-sized particles are generated during high-energy operations like sawing, cutting, grinding, drilling, excavating, and crushing silica-containing materials, or when abrasive blasting with silica-containing materials or on substrates that contain silica.

There are recognized health effects from exposure to respirable crystalline silica. It is not just an inert dust. Most common is silicosis, a permanent and debilitating respiratory disease. The disease involves scarring in the lungs, making them less flexible and less able to utilize oxygen. There are 3 forms of silicosis: Acute (marked by high intense exposures over a short period of time); Accelerated (which can develop after exposure from 5-10 years); and Chronic (from long term exposure to lower levels).

Silica can also cause chronic obstructive pulmonary disease (COPD), including chronic bronchitis, emphysema, and chronic airway obstruction. It can make you more susceptible to tuberculosis. And there are non-respiratory diseases associated with silica exposure, including kidney disease and autoimmune disorders such as scleroderma, lupus, and rheumatoid arthritis.

While OSHA has had permissible exposure limits for a long time, in 2016 they developed a standard for silica exposure in construction, which incorporates required engineering and work practice controls, employee exposure monitoring, respiratory protection and medical surveillance to protect employees exposed to silica dust during normal maintenance, renovation, and demolition activities. The standard does not apply to tasks where employee exposures will remain below the Action Level of 25 $\mu\text{g}/\text{m}^3$ under any foreseeable conditions. If the exposure is below the action level due to engineering controls, however, the standard still applies. The standard also does not apply to occasional, brief activities with minimal exposures to silica. For example, occasional drilling which is incidental to a normal occupation, using a hand-held drill for less than 15 minutes.

The elements of this exposure control plan take into consideration all of the components of the OSHA Silica in Construction standard.

VI. Responsibilities

A. Division of Environmental Health and Safety (EHS)

- a. Provides information to the University administration to support decisions on silica management;
- b. Conducts Silica Awareness training;

- c. Provides expertise and guidance to departments to maintain compliance with regulatory requirements and university policy;
- d. Recommends appropriate response actions to control or eliminate potential hazards;
- e. Audits projects as necessary;
- f. Communicates with regulatory agencies, as needed, as well as with the University community at large;
- g. Develops and maintains the Silica in Construction Exposure Control Plan;
- h. Conducts screenings for employee exposure determinations;
- i. Coordinates with affected departments to secure consultants to provide employee exposure assessments;
- j. Develops and maintains the Respirator Program, as well as conducts respirator training and fit testing; and
- k. Maintains records as required under section XVII of this plan.

B. Departments Employing Maintenance and Custodial Personnel

- a. Identify a competent person(s) for respirable crystalline silica;
- b. Schedule Silica Awareness training for employees as necessary;
- c. Notify EHS in cases of uncontrolled releases of visible dust in occupied buildings;
- d. Provide engineering and work practice controls as identified in Table 1, or alternative controls, as needed;
- e. Responsible for employee exposure assessments when necessary, scheduled with the assistance of EHS;
- f. Schedule medical surveillance for affected employees, initially and then every 3 years unless sooner as identified by the PLHCP;
- g. Arrange for medical evaluation for respirator use, in accordance with the University's Respirator Program; and
- h. Schedule employees for respirator training and fit testing annually.

C. Competent Persons

- a. Frequently and regularly inspect job sites, materials and equipment;
- b. Identify existing and foreseeable respirable crystalline silica hazards and take prompt action;
- c. Be familiar with the Silica in Construction Exposure Control Plan;
- d. Be available to employees for questions about or problems with dust controls; and

- e. Notify EHS when problems arise, there is a change in engineering controls and work practices, or in situations of uncontrolled releases of visible dust in occupied buildings.

D. Maintenance Personnel

- a. Comply with Federal and State regulations and UConn policies as advised by EHS;
- b. Attend Silica Awareness training;
- c. Attend Respiratory Protection Training and Fit Testing as necessary;
- d. Utilize the proper engineering controls and work practices;
- e. Wear respirators when necessary; and
- f. Conduct work activities in a manner that prevents uncontrolled disturbance of silica-containing materials and the generation of visible dust.

E. Departments securing services of outside trade contractors

- a. Ensure compliance with the University's Silica in Construction Exposure Control Plan in reference to the Restricted Access and Housekeeping paragraphs;
- b. Distribute the Contactor EHS Manual to contractors and receive appropriate certifications prior to any work;
- c. Per the Contractor EHS Manual, obtain from the contractor an air quality control plan to prevent negatively impacting building occupants' air quality; and
- d. If suitable air quality cannot be achieved, schedule work outside of normal working hours.

VII. Tasks

The OSHA standard requires the employer to identify tasks in the workplace that involve exposure to respirable crystalline silica. The University has a number of trades over several different departments that are responsible for maintenance and renovation of UConn buildings, hardscapes, utilities and landscapes. Potential silica-containing substrates and materials encountered include asphalt, brick, cement, concrete, concrete block, drywall, grout, mortar, paints containing silica, plasters, rock, roof tile, sand, soil, stone, stucco, terrazzo, clay and ceramic tile. And activities impacting these materials also vary, including cutting/sawing, demolishing/disturbing, drilling/coring, earthmoving, grinding, jackhammering, milling, mixing/pouring, sanding, scarifying, scraping, and even clean-up activities such as sweeping and vacuuming.

OSHA has published a list of typical equipment and tasks, and necessary engineering controls and respiratory protection. This list is identified as Table 1 in the standard and can be found in Appendix A of this plan. When employers comply with the requirements of Table 1, employee exposure monitoring is not required. **Integrated water delivery systems and shrouded power equipment with HEPA exhaust are the primary methods of control for all activities that disturb silica-containing materials.** When these controls are not feasible or a different type of engineering control is utilized, employee exposure monitoring will be conducted to assess exposure. The equipment/tasks identified in Table 1 that are likely to occur at the University include use of:

- stationary masonry saws;
- handheld power saws;
- walk-behind saws;
- rig-mounted core saws and drills;
- handheld and stand-mounted drills (including impact and rotary hammer drills);
- dowel drilling rigs for concrete;
- jackhammers and power-chipping tools;
- handheld grinders for mortar removal and other uses;
- heavy equipment and utility vehicles for abrading and fracturing silica containing materials and demolition activities; and
- heavy equipment and utility vehicles for tasks such as grading and excavating.

When conducting activities found in Table 1, the University will strive to comply with the necessary engineering controls and respiratory protection identified in the Table. When the controls methods identified are not feasible, employee exposure monitoring will be conducted and respiratory protection will be used.

Additionally, other activities can occur on silica-containing materials that are not represented in the Table 1 list of equipment/tasks and control measures. Such activities include scraping of painted drywall and plasters, light demolition activities involving handheld tools and reciprocating saws, mixing and pouring, and cleanup methods. Engineering and work practice controls will be used, employee exposure monitoring will be conducted and respiratory protection will be employed, as necessary.

VIII. Regulatory Requirements

The OSHA Silica in Construction Standard and this plan apply to all exposures that exceed the Action Level of $25 \mu\text{g}/\text{m}^3$. Employees conducting activities that are not identified in Table 1 or that do not comply with the engineering controls identified must undergo employee exposure monitoring to determine if their exposures exceed the Action Level, without considering the use of respiratory protection. If exposures are found to exceed the Permissible Exposure Limit of $50 \mu\text{g}/\text{m}^3$, then respiratory protection will be required for those activities.

IX. Employee exposure monitoring

Employees utilizing alternative control measures to those identified in Table 1, and conducting activities not represented in Table 1 where they can reasonably be expected to be exposed to respirable crystalline silica, must undergo employee exposure assessment. The purpose of the assessments is to identify where exposures are occurring, help to determine proper and effective control methods, and to prevent exposures above the Permissible Exposure Limit.

There are two options when it comes to employee exposure monitoring: the performance option and the scheduled monitoring option. For each, the employer needs to ensure the assessment reflects the exposures of each employee on each shift, for each job classification, in each work area.

With the performance option, the employer can use monitoring data and objective data to determine exposures. Objective data would include historical monitoring data, data from industry-wide surveys, and direct-reading meters along with concentrations of silica in the impacted medium to calculate exposures. In order to use historical or industry-wide data, the workplace conditions must match the activities previously monitored. They have to be similar processes, types of materials, control strategies, and environmental conditions. The performance option must occur before work begins and must be reassessed whenever there is a change in work conditions.

The scheduled monitoring option identifies when and how often monitoring must be done when not relying on historical and industry-wide data. In this option, initial monitoring is conducted as soon as work begins, and the results dictate when further testing is necessary. If initial results are below the action level, no further testing is required. If results are above the action level but below the PEL, monitoring must be repeated every 6 months. If initial results are above the PEL, monitoring occurs every 3 months. Should the workplace conditions change (change in materials, controls, environmental conditions), monitoring will need to be repeated and then follow the same schedule.

EHS can assist with determining employee exposures. If industry-wide data and historical data is not available, introductory direct-reading meters can be used to assess conditions. If employee exposure assessments are necessary, EHS can help the department select an appropriate industrial

hygiene consultant to conduct the monitoring and determine response actions. All affected employees represented by the assessment must be notified of results within 5 days of receipt, by written notification or posting in a common, accessible space.

X. Competent Persons

Competent persons must be identified to frequently and regularly inspect job sites, materials, and equipment to implement this *management plan*. This person is someone who can identify existing and foreseeable respirable crystalline silica hazards and is authorized to take prompt corrective action. The competent person can be someone that is also working on the jobsite or task.

Each department employing workers affected by the OSHA Silica in Construction standard and this management plan must identify a competent person and communicate that information to the affected employees and to EHS.

XI. Engineering and work practice controls

Engineering and work practice controls must be utilized to keep employee exposures below the PEL, regardless of the use of respiratory protection. Engineering controls are more effective than respiratory protection and must be used unless such controls are not feasible (e.g., water use around electrical equipment or in indoor environments that could lead to other hazards such as mold).

Integrated water delivery systems are the most effective engineering control, and even the use of wet methods for clean-up and simple sanding and scraping can greatly reduce exposures. The integrated water delivery systems must supply an adequate supply of water for dust suppression, the nozzle must be working properly to apply the water at the point of generation and should not be clogged, and all hoses and connections must be intact. Flow rates must be supplied by the manufacturer. See Table 1 in Appendix A for specific requirements for equipment/tasks.

Some equipment can be equipped with commercially available dust collection systems. In this case, the shroud or cowl must be intact and installed by the manufacturer's instructions, the hose connecting the tool to the vacuum must be intact and not kinked, air flow must be provided as recommended by the manufacturer, the filters must be rated a minimum of 99% efficiency and cleaned and changed in accordance with the manufacturer's instructions, and dust collection bags must be emptied to avoid overfilling. Some tools have additional requirements that dust collectors must provide 25 cubic feet per minute (CFM) or greater of airflow per inch of wheel diameter (such as grinders). See Table 1 in Appendix A for specific requirements for equipment/tasks.

Enclosed cabs are identified as engineering and work practices for several tasks in Table 1 including vehicle-mounted drilling rigs and other heavy equipment and utility vehicles used for abrading and

fracturing silica-containing materials and grading and excavating operations. For these measures that require enclosed cabs, there are requirements of the cab that need to be met and maintained:

- Is maintained as free as practicable from settled dust;
- Has door seals and closing mechanisms that work properly;
- Has gaskets and seals that are in good condition and working properly;
- Is under positive pressure maintained through continuous delivery of fresh air;
- Has intake air that is filtered through a filter that is 95% efficient in the 0.3-10.0 μm range (e.g., MERV-16 or better); and
- Has heating and cooling capabilities.

For tasks not identified in Table 1 efforts will be made to utilize engineering controls such as water delivery systems and wet methods or ventilation to reduce exposures, unless not feasible.

XII. Housekeeping

In addition to following engineering and work practice controls recommended by OSHA and industry practice during activities that produce respirable crystalline silica exposure, housekeeping must also be addressed since this could contribute to employee exposure. Some activities, such as using drills, requires the use of HEPA vacuums to clean out the drill holes after they are made.

Clean-up activities involving respirable crystalline silica dust must be done utilizing wet methods and/or HEPA vacuums. Dry brushing, dry sweeping, and use of compressed air are prohibited when cleaning up silica dust. Compressed air can only be used when there is a ventilation system that captures the dust cloud.

When wet methods would cause damage or create a hazard in the workplace, it is not required to be used. In this instance, other means of cleaning must be considered, such as use of the HEPA vacuums.

During activities indoors, efforts should be made to contain the dust as it is generated with the use of drop cloths and catch bags when feasible. This will reduce potential for dust becoming airborne and aid final cleaning efforts. During final cleaning, all horizontal and vertical surfaces must be wet wiped or HEPA vacuumed. No visible dust or residue should remain.

XIII. Restricting access

In addition to protecting employees conducting the tasks on silica containing materials, building occupants, staff, students, and the public must be protected from the generation of silica dust. When conducting work indoors, or in areas outdoors adjacent to the public, access to the work area must be restricted. Outdoors, barrier tape and/or fencing must be used to prevent access, as

necessary. Visible dust must not leave the worksite. Signs must be posted to prevent others from accessing the worksite. Examples of signs can be found in Appendix B.

Indoors, additional means may be necessary to protect building occupants. First of all, building occupants must be notified of projects through the [BECList](#). Schedule project outside of normal working hours when area is less occupied if restricting access is problematic or if suitable air quality cannot be maintained. Barrier tape or plastic sheeting must be used to separate the worksite from the rest of the building. Signs must be posted at the entrance to the worksite to prevent access. Examples of appropriate signs can be found in Appendix B. If engineering controls and work practice controls are not sufficient to eliminate visible dust or are not feasible, exhaust ventilation must be utilized in the space to reduce exposures and prevent migration of dust outside the workspace. Visible dust must not leave the worksite. Should visible airborne silica dust be generated at the worksite, or if airborne silica exposures are above the PEL, the area must be considered a regulated area and respiratory protection will be mandated for anyone entering the space.

XIV. Respiratory Protection

Respiratory protection will be required during certain activities when engineering and work practice controls are not effective enough to reduce exposure and when these controls are not feasible. Respirators will be required when exposures exceed the PEL:

- during periods necessary to install or implement feasible engineering and work practice controls;
- during tasks such as maintenance and repair where these controls are not feasible; and
- during tasks where engineering and work practice controls are not sufficient. Even when these controls are not sufficient, they still must be used to reduce exposure, in combination with respiratory protection.

Respirator use at the University must be in accordance with the OSHA Respirator Standard and the University's Respirator Program. When respirators are required, employees must undergo a medical evaluation by a physician or other healthcare professional, and then attend training and fit testing. These are annual requirements. See the [EHS website](#) for further information on the program, medical evaluation process, and training and fit testing.

Silica dust is a particulate so respirators with particulate filters will be selected. For most operations and tasks where respirators are required (whether as identified in Table 1 or by employee exposure assessments), those respirators that are identified as having an assigned protection factor (APF) of 10 will be selected. These respirators include properly fitted filtering facepiece respirators or dust

masks with an N95 filter, or a properly fitted $\frac{1}{2}$ face elastomeric respirator with HEPA (P100) cartridges.

Table 1 assigns respirators based upon the equipment/task, locations and the length of time the activity will be conducted. Often work indoors or in an enclosed area will require respiratory protection.

Some tasks will require a higher level of respiratory protection. For example, use of handheld grinders for mortar removal, even with a dust collection system, requires a respirator with an APF of 10 if done for less than 4 hours, but a respirator with an APF of 25 or greater if the task lasts longer than 4 hours.

At the University, powered air-purifying respirators (PAPR) with hoods or head coverings or full-face respirators will be selected if a greater level of protection is necessary. Full-face respirators have a greater assigned protection factor than some PAPRs, 50 instead of 25.

Voluntary use of filtering face-piece respirators, or dust masks, are allowed when exposures to silica do not exceed the PEL, and when respirators are not mandated in Table 1. Employees can choose to wear these masks for comfort purposes only. Compliance with the OSHA Respirator Standard and the University's Respirator Program are still required. Training will be necessary for voluntary use of these respirators. See the EHS website for information on training opportunities.

XV. Medical surveillance

Medical surveillance will be required for any employee who performs tasks that require respirators to protect against silica exposure (as indicated in Table 1) for 30 or more days a year. If the employee performs such tasks for any length of time during the day, that counts as one day of exposure.

Medical surveillance is required upon an employee's initial assignment to a job in which such tasks will be performed for 30 days or more a year and must be repeated every 3 years, or more frequently if recommended by the PLHCP.

Components of the surveillance include:

- A medical and work history that focuses on past, present and anticipated exposure to respirable crystalline silica and other agents affecting the respiratory system; and any history of respiratory system dysfunction and symptoms of disease;
- A physical exam that focuses on the respiratory system;
- A digital or chest X-ray;
- A lung function (spirometry) test;
- Testing for latent tuberculosis infection; and

- Any other tests deemed appropriate by the PLHCP.

Information Provided to the PLHCP:

- A copy of the Silica in Construction Standard;
- A description of the employee's former, current and anticipated duties as they relate to the employee's occupational exposure to respirable crystalline silica;
- The employee's former, current, and anticipated levels of occupational exposure to respirable crystalline silica;
- A description of the personal protective equipment used or to be used by the employee, including when and for how long the employee has used or will use that equipment; and
- Information from records of employment-related medical examinations previously provided to the employee and currently within the control of the employer.

Scheduling an Examination

Medical surveillance and examinations required under this exposure control plan are the responsibility of the employing department. Medical examinations for University employees are provided by the University of Connecticut Occupational and Environmental Health Center (OEHC) Clinic at the University of Connecticut Health Center in Farmington, or CorpCare Occupational Health in South Windsor, CT. Other providers may be used with the prior approval of EHS. Call the OEHC Clinic at (860)679-4564 or CorpCare at (860)647-4796 to schedule an exam. Tell the person who answers that you wish to schedule medical surveillance for crystalline silica. You will be asked for the employee's name, department number, the name of the employee's supervisor, and pertinent departmental financial information. Personal health insurance must not be used.

Once the appointment has been scheduled, contact EHS at (860)486-3613 and inform them of the pending appointment.

Employees must receive a written medical report within 30 days of the medical examination performed. Employers do not receive these reports. Instead, the employer must receive a written medical opinion within 30 days of the examination.

The medical opinion must include:

- Date of the examination
- Statement that the examination has met the requirements of the silica standard
- Any recommended limitations on the employee's use of respirators
- If the employee provides written authorization, the written opinion to the employer shall also contain either or both of the following:

- Any recommended limitations on the employee's exposure to respirable crystalline silica
- A statement that the employee should be examined by a specialist if deemed appropriate by the PLHCP

XVI. Training

All University employees affected by this standard and exposure control plan must be trained in silica awareness and demonstrate knowledge and understanding in the following topics:

- Health hazards associated with respirable crystalline silica, including cancer, lung effects, immune system effects, and kidney effects;
- Specific tasks in the workplace that could result in exposure to respirable crystalline silica;
- Specific measures the employer has implemented to protect employees from exposure, including engineering and work practice controls as well as respiratory protection;
- The contents of the OSHA Silica in Construction Standard;
- The identity of the competent person;
- The purpose and description of the medical surveillance program; and
- The availability of the OSHA Silica in Construction Standard, 1926.1153.

Training is required upon initial assignment to the job where silica-containing materials will be impacted. EHS will provide training in accordance with this plan. Retraining will be necessary if a new task or equipment is introduced, or new controls are introduced, and any time there is a deficiency in the employee's knowledge. For example, if an employee is found working without using the required engineering or work practice controls.

XVII. Recordkeeping

Records that are required to be collected and maintained under this exposure control plan are noted below. Departments must forward to EHS copies of UConn employee exposure assessment records that they receive from consultants. EHS will maintain employee exposure assessments and objective data records. Departments will keep medical surveillance records in the employees' personnel files.

Employee Exposure Assessments

- Date measurement taken;
- Sampling and analytical method used;
- Number, duration and results of samples taken;

- Laboratory that performed analysis;
- Type of personal protective equipment worn by those monitored;
- Name, social security number, and job classification of all employees represented by the monitoring, indicating which employees were actually monitored; and
- Maintained in accordance with 1910.1020, for at least 30 years.

Objective Data relied on for compliance

- The crystalline silica-containing material in question;
- The source of the objective data;
- The testing protocol and results;
- A description of the process, task, activity, material, or exposures on which the objective data were based;
- Other data relevant to the process, task, activity, material or exposures on which the objective data were based; and
- Maintained in accordance with 1910.1020, for at least 30 years.

Medical Surveillance

- Name and social security number
- A copy of the PLHCPs' and specialists' written medical opinions
- A copy of the information provided to the PLHCPs and specialists
- Maintained in accordance with 1910.1020, for duration of employment plus thirty years.

Appendix A

Table 1

<https://www.osha.gov/silica/Table1sect1926.1153.pdf>

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 hours /shift	> 4 hours /shift
(i) Stationary masonry saws	<p>Use saw equipped with integrated water delivery system that continuously feeds water to the blade.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p>	None	None
(ii) Handheld power saws (any blade diameter)	<p>Use saw equipped with integrated water delivery system that continuously feeds water to the blade.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <ul style="list-style-type: none"> – When used outdoors. – When used indoors or in an enclosed area. 	<p>None</p> <p>APF 10</p>	<p>APF 10</p> <p>APF 10</p>

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(iii) Handheld power saws for cutting fiber-cement board (with blade diameter of 8 inches or less)	<p>For tasks performed outdoors only:</p> <p>Use saw equipped with commercially available dust collection system.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <p>Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency.</p>	None	None
(iv) Walk-behind saws	<p>Use saw equipped with integrated water delivery system that continuously feeds water to the blade.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <ul style="list-style-type: none"> – When used outdoors. – When used indoors or in an enclosed area. 	<p>None</p> <p>APF 10</p>	<p>None</p> <p>APF 10</p>
(v) Drivable saws	<p>For tasks performed outdoors only:</p> <p>Use saw equipped with integrated water delivery system that continuously feeds water to the blade.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p>	None	None

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(vi) Rig-mounted core saws or drills	<p>Use tool equipped with integrated water delivery system that supplies water to cutting surface.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p>	None	None
(vii) Handheld and stand-mounted drills (including impact and rotary hammer drills)	<p>Use drill equipped with commercially available shroud or cowling with dust collection system.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <p>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.</p> <p>Use a HEPA-filtered vacuum when cleaning holes.</p>	None	None
(viii) Dowel drilling rigs for concrete	<p>For tasks performed outdoors only:</p> <p>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.</p> <p>Use a HEPA-filtered vacuum when cleaning holes.</p>	APF 10	APF 10
(ix) Vehicle-mounted drilling rigs for rock and concrete	<p>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.</p>	None	None
	<p>OR</p> <p>Operate from within an enclosed cab and use water for dust suppression on drill bit.</p>	None	None

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(x) Jackhammers and handheld powered chipping tools	Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact.		
	– When used outdoors.	None	APF 10
	– When used indoors or in an enclosed area.	APF 10	APF 10
	OR		
(xi) Handheld grinders for mortar removal (i.e., tuckpointing)	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.		
	Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism.		
	– When used outdoors.	None	APF 10
(xi) Handheld grinders for mortar removal (i.e., tuckpointing)	– When used indoors or in an enclosed area.	APF 10	APF 10
(xi) Handheld grinders for mortar removal (i.e., tuckpointing)	Use grinder equipped with commercially available shroud and dust collection system.	APF 10	APF 25
	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.		

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xii) Handheld grinders for uses other than mortar removal	For tasks performed outdoors only: Use grinder equipped with integrated water delivery system that continuously feeds water to the grinding surface. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. OR 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.	None	None
	– When used outdoors.	None	None
	– When used indoors or in an enclosed area.	None	APF 10

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xiii) 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.	None	None
	OR 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.	None	None
(xiv) 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.	None	None

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xv) 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.	None	None
	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.	None	None
	OR 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.	None	None
(xvi) 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.	None	None

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xvii) Heavy equipment and utility vehicles used to abrade or fracture silica-containing materials (e.g., hoe-ramping, rock ripping) or used during demolition activities involving silica-containing materials	Operate equipment from within an enclosed cab. When employees outside of the cab are engaged in the task, apply water and/or dust suppressants as necessary to minimize dust emissions.	None None	None None
(xviii) Heavy equipment and utility vehicles for tasks such as grading and excavating but not including: demolishing, abrading, or fracturing silica-containing materials	Apply water and/or dust suppressants as necessary to minimize dust emissions. OR When the equipment operator is the only employee engaged in the task, operate equipment from within an enclosed cab.	None None	None None

(2) When implementing the control measures specified in Table 1, each employer shall:

- (i) For tasks performed indoors or in enclosed areas, provide a means of exhaust as needed to minimize the accumulation of visible airborne dust;
- (ii) For tasks performed using wet methods, apply water at flow rates sufficient to minimize release of visible dust;
- (iii) For measures implemented that include an enclosed cab or booth, ensure that the enclosed cab or booth:
 - (A) Is maintained as free as practicable from settled dust;
 - (B) Has door seals and closing mechanisms that work properly;
 - (C) Has gaskets and seals that are in good condition and working properly;
 - (D) Is under positive pressure maintained through continuous delivery of fresh air;
 - (E) Has intake air that is filtered through a filter that is 95% efficient in the 0.3-10.0 µm range (e.g., MERV-16 or better); and
 - (F) Has heating and cooling capabilities.

(3) Where an employee performs more than one task on Table 1 during the course of a shift, and the total duration of all tasks combined is more than four hours, the required respiratory protection for each task is the respiratory protection specified for more than four hours per shift. If the total duration of all tasks on Table 1 combined is less than four hours, the required respiratory protection for each task is the respiratory protection specified for less than four hours per shift.

Appendix B
Signage for Restricted Access



Appendix C

Approved Respirators

Assigned Protection Factor (APF) 10



Assigned Protection Factor (APF) 25



Assigned Protection Factor (APF) 50



Appendix D

1926.1153 Silica in Construction Standard

<https://www.osha.gov/silica/SilicaConstructionRegText.pdf>