

OPS-SH-0012

Respirable Crystalline Silica Policy

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1 Purpose

The purpose of this Respirable Crystalline Silica Policy is to establish minimum requirements and responsibilities to protect the safety and health of Ampirical Solutions employees and contractors from harmful exposure to respirable crystalline silica.

2 Scope

This policy applies to all Ampirical Solutions employees and subcontractors performing activities that may create an exposure to crystalline silica. When working on client sites, the client's policy takes precedence unless it is less stringent or non-existent, in which case Ampirical Solutions' policy will be used. This policy provides minimum requirements to be followed in accordance with 29 CFR 1910.1053 and 29 CFR 1926.1153.

3 Definitions

3.1 Action Level

- A concentration of airborne respirable crystalline silica of 25 µg/m³, calculated as an 8-hour time weight average (TWA).

3.2 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.

3.3 Employee Exposure

- Exposure to a concentration of an airborne contaminant that would occur if the employee were not using respiratory protection.

3.4 High Efficiency Particulate Air (HEPA) Filter

- A filter that is at least 99.97% efficient in removing monodispersed particles of 0.3 micrometers in diameter. The equivalent NIOSH 42 CFR 84 particulate filters are the N100, R100, and P100 filters.

3.5 Permissible Exposure Limit

- A concentration of airborne respirable crystalline silica of 50µg/m³, calculated as an 8-hour TWA.

3.6 Respirable Silica

- Quartz, cristobalite, and/or tridymite contained in airborne particles that are determined to be respirable when collected using a respirable-particle-size selective sampling device.

3.7 Silicosis

- A form of interstitial fibrosis that is caused by exposure to respirable silica particles.

3.8 Local Exhaust Ventilation (LEV)

- Ventilation designed to capture an emitted contaminant at or near its source, before the contaminant has a chance to disperse into the air.

4 Responsibilities

4.1 Managers and Supervisors

- Ensure that all employees have been trained and fully understand the requirements of this policy.
- Ensure personnel are aware of work activities which have the potential for exposure to respirable crystalline silica.
- Ensure that workers are using the proper respirators and have been fit-tested, and that the results are recorded.
- Direct the work in a manner that ensures the risk to workers is minimized and adequately controlled.
- Communicate with the prime contractor and other sub-contractors to ensure a safe work environment.

4.2 HSE Department

- Coordinate training for all applicable personnel.
- Develop and implement a written silica exposure control plan (ECP) (see Appendix B) in coordination with the HSE Department.
- Select, implement, and document the appropriate site-specific control measures.
- Provide adequate instruction to workers on the hazards of working with silica containing materials (e.g., concrete) and on the precautions specified in the site-specific plan.
- Provide support, monitoring and other required actions as requested by Managers and Supervisors.

4.3 Employees

- Know the hazards of silica dust exposure.
- Use the assigned protective equipment in an effective and safe manner.
- Follow the safe work practices identified in the site-specific plan.
- Follow established work procedures as directed by the supervisor.
- Reporting any unsafe condition or acts to the supervisor.
- Know how and when to report exposure incidents.

5 Procedure

5.1 General

- Quartz is the most common form of crystalline silica. Quartz is present in many materials in the construction industry, such as brick and mortar, concrete, slate, dimensional stone (granite and sandstone), stone aggregate, tile, and sand used for blasting. Other construction materials that contain crystalline silica are asphalt filler, roofing granules, plastic composites, soils, and (to a lesser extent) some wallboard joint compounds, paint, plaster, caulking, and putty. Cristobalite, a less common form of crystalline silica, is formed at high temperatures ($>1,470^{\circ}\text{C}$) in nature and by industrial processes. The ceramic and brick lining of boilers and vessels, some ceramic tiles, and volcanic ash contain cristobalite.

5.2 Risk Identification

- Crystalline silica is usually contained in concrete and masonry products and is released via dust. The following activities may cause crystalline silica dust to become airborne:

- Sawing, hammering, cutting, drilling, grinding, and chipping of concrete or masonry.
 - Jackhammering, chipping, or drilling rock or concrete.
 - Street sweeping, dry sweeping of concrete, rock, or sand dust.
 - Crushing, loading, hauling, and dumping rock or aggregate.
 - Demolition of concrete and masonry structures.
 - Concrete mixing.
- Concrete can contain a high percentage of silica. Cutting, drilling, grinding, chipping, or jackhammering without the use of proper dust controls and PPE can expose employees to levels of airborne respirable crystalline silica that are above the established occupational exposure limits. An exposure assessment shall be performed on tasks that may reasonably be expected to create exposures over the Action Level (25 µg/m³).

5.3 Exposure Assessments

- If a jobsite implements the engineering controls, work practices, and respiratory protection found in Appendix A – OSHA 29 CFR 1926.1153 Table 1, *Specified Exposure Control Methods When Working with Materials Containing Crystalline Silica*, an exposure assessment is not required.
- However, for tasks not listed in Appendix A – OSHA 29 CFR 1926.1153 Table 1 or where a jobsite does not fully and properly implement the controls reflected in the Appendix above, an exposure assessment is required.
- The exposure of each employee who is or may reasonably be expected to be exposed to respirable crystalline silica at or above the action level will be assessed in accordance with either the performance option, or the scheduled monitoring option.
- Performance option:
 - The 8-hour TWA exposure for each employee will be assessed on the basis of any combination of air monitoring data or objective data sufficient to accurately characterize employee exposures to respirable crystalline silica.
- Scheduled monitoring option:
 - Initial monitoring will be performed to assess the 8-hour TWA exposure for each employee on the basis of one or more personal breathing zone air samples that reflect the exposures of employees on each shift, for each job classification, in each work area. Where several employees perform the same tasks on the same shift and in the same work area, the employer may sample a representative fraction of these employees in order to meet this requirement. In representative sampling, the employer will sample the employee(s) who are expected to have the highest exposure to respirable crystalline silica.
 - If initial monitoring indicates that employee exposures are below the action level, monitoring may be discontinued for those employees whose exposures are represented by such monitoring.
 - Where the most recent exposure monitoring indicates that employee exposures are at or above the action level but at or below the permissible exposure limit (PEL), such monitoring will be repeated within six months of the most recent monitoring.
 - Where the most recent exposure monitoring indicates that employee exposures are above PEL, such monitoring will be repeated within three months of the most recent monitoring.

- Where the most recent (non-initial) exposure monitoring indicates that employee exposures are below the action level, monitoring will be repeated within six months of the most recent monitoring until two consecutive measurements, taken seven or more days apart, are below the action level, at which time the monitoring can be concluded for those employees whose exposures are represented by such monitoring. Except whenever a change in the production, process, control equipment, personnel, or work practices may reasonably be expected to result in new or additional exposures at or above the action level, or when the employer has any reason to believe that new or additional exposures at or above the action level have occurred.
- Methods of sample analysis:
 - All samples taken must satisfy the monitoring requirements stated above and be evaluated by an appropriately accredited laboratory that analyzes air samples for respirable crystalline silica in accordance with this policy.
- Employee notification of assessment results:
 - Within five (5) working days after completing an exposure assessment, all affected individuals will be notified in writing of the results of that assessment, or the results will be posted in an appropriate location accessible to all affected employees.
 - Whenever an exposure assessment indicates that employee exposure is above the PEL, the notification will describe the corrective action being taken to reduce employee exposure to or below the PEL.

5.4 Medical Surveillance

- A medical surveillance program will be implemented at sites where an employee will be required to use a respirator for 30 or more days per year while performing tasks that have been identified as potential silica exposures. The physical will be performed by a physician or licensed health care professional (PLHCP) and will be at no charge to the employee.
- An initial (baseline) medical examination will be made available within 30 days after initial assignment, unless the employee has received a medical examination that meets the requirements of this section within the last three years. The examination will consist of:
 - A medical and work history, with emphasis on: Past, present, and anticipated exposure to respirable crystalline silica, dust, and other agents affecting the respiratory system; any history of respiratory system dysfunction, including signs and symptoms of respiratory disease (e.g., shortness of breath, cough, wheezing); history of tuberculosis; and smoking status and history.
 - A physical examination with special emphasis on the respiratory system.
 - A chest X-ray (a single posteroanterior radiographic projection or radiograph of the chest at full inspiration recorded on either film (no less than 14 x 17 inches and no more than 16 x 17 inches) or digital radiography systems), interpreted and classified according to the International Labor Office (ILO) International Classification of Radiographs of Pneumoconiosis by a NIOSH- certified B Reader.
 - A pulmonary function test to include forced vital capacity (FVC) and forced expiratory volume in one second (FEV1) and FEV1/FVC ratio, administered by a spirometry technician with a current certificate from a NIOSH-approved spirometry course.
 - Testing for latent tuberculosis infection.
 - Any other tests deemed appropriate by the PLHCP.

- The medical examinations will be repeated every three years, or more frequently if required by the PLHCP.
- Information provided to the PLHCP:
 - A copy of the OSHA respirable crystalline silica rule.
 - A description of the employees' 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 any 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.
 - Information from records of employment-related medical examinations previously provided to the employee and currently within the control of the employer.
- PLHCP's written medical report for the employee:
 - The employer will ensure that the PLHCP explains to the employee the results of the medical examination and provides each employee with a written medical report within 30 days of each medical examination performed. The written report will contain:
 - A statement indicating the results of the medical examination, including any medical condition(s) that would place the employee at increased risk of material impairment to health from exposure to respirable crystalline silica and any medical conditions that require further evaluation or treatment.
 - Any recommended limitations on the employee's use of respirators.
 - A statement that the employee should be examined by a specialist if the chest X-ray provided in accordance with this section is classified as 1/0 or higher by the B Reader, or if a referral to a specialist is otherwise deemed appropriate by the PLHCP.
- PLHCP's written medical opinion for the employer:
 - A written medical opinion from the PLHCP will be obtained within 30 days of the medical examination. The written opinion will contain only the following:
 - The date of the examination.
 - A statement that the examination has met the requirements of this section.
 - Any recommended limitations on the employee's use of respirators.
- Each employee will receive a copy of the written medical opinion within 30 days of each medical examination performed.

5.5 Engineering and Work Practice Controls

- Engineering and work practice controls will be used to reduce and maintain employee exposure to respirable crystalline silica to or below the PEL, unless it can be demonstrated that such controls are not feasible. Wherever such feasible engineering and work practice controls are not sufficient to reduce employee exposure to or below the PEL, they will be used to reduce employee exposure to the lowest feasible level and will supplement them with the use of respiratory protection.
- The following hierarchy of control measures must be followed:
 - Elimination/substitution (e.g., using products with less silica or using work methods that would eliminate the need for surface grinding)
 - Engineering controls (e.g., water, local exhaust ventilation, enclosure)
 - Administrative controls (e.g., coordination of tasks with subcontractors, signage)

- The use of proper PPE such as respirators, gloves, coveralls, and eye protection when exposed to silica.
- Our firm commits to developing knowledge and expertise about these controls, and to establishing policies/procedures to protect workers from harmful exposure and to minimize reliance on respirators. Effective engineering controls such as HEPA vacuum attachments and wetting methods, which control silica dust at its source, are readily available. These controls have been proven to reduce airborne dust levels significantly when selected and operated in accordance with best practices. Engineering controls alone do not reduce airborne silica to safe levels; so, in most cases other control measures, including respiratory protection, will be necessary.

5.6 Silica Dust Control

- Utilizing dust suppressants (water) while cutting, grinding, or drilling, and using local exhaust ventilation (LEV), are the preferred engineering controls and should always be the first choice for exposure control. Air discharged from an LEV system will not be re-circulated into the work area.
- For certain applications or work locations, dry cutting or grinding of silica-containing materials (e.g., concrete) may be required. If this is the case, dry work will be isolated from other work areas and will require the use of additional respiratory protection and other controls. Effective LEV will be used in order to control the dust. A HEPA vacuum will be used for cleanup and decontamination.
- Local Exhaust Ventilation:
 - When LEV is used in work, the following systems and safe work practices will be employed:
 - Vacuum attachment systems to capture and control the dust at its source whenever possible.
 - Dust control systems (used regularly and well maintained).
 - Grinding wheels operated at the manufacturers' recommended rpm (operating more than this can generate significantly higher airborne dust levels).
 - Retrofit shrouds or exhaust cowlings for corner grinding and use manufacturer-specified rpm speeds and a well-maintained HEPA vacuum.
 - Diamond stone grinders, which allow for the use of a more efficient suction casing on the grinder, whenever practicable.
 - HEPA or good quality, multi-stage vacuum units approved for use with silica dust. [The vacuum units should create a target airflow of at least 70 cfm. This should achieve a face velocity at the shroud of about 1.3 m/s (260 fpm)—the higher the face velocity, the more dust captured at source.]
 - Work planning so that concrete grinding can be completed when wet (dust release can be significantly reduced).
 - Train workers and supervisors on how to properly use and maintain the equipment.

Note: A shop vacuum equipped with a HEPA filter alone does not satisfy Appendix A – OSHA 29 CFR 1926.1153 Table 1 dust collection requirements. Dust extraction systems used for silica-generating tasks must also incorporate a cyclonic pre-separator or an automatic filter-cleaning mechanism, as specified in Appendix A listed above.

- When using a grinder equipped with commercially available shroud and dust collection system, the shroud must be of a sufficient size to fully encompass the area being worked. The dust shroud shall maintain effective, flat contact and containment at the grinding surface to maximize dust capture and vacuum performance.
- Wet Methods for Dust Control:
 - When water spray systems are used, the following safe work practices must be followed:
 - Pneumatic grinders will be used instead of electric-powered grinders if water is the method of control.
 - Pressure and flow rate of water will be controlled in accordance with tool manufacturers' specifications (for cutting saws, a minimum of 0.5 liters of water per minute should be used).
 - When sawing concrete or masonry, only saws that provide water to the blade will be used.
 - Wet slurry will be cleaned from work surfaces when the work is completed, using a wet vacuum or wet sweeping.
 - When using rubbing blocks on concrete, the concrete surface shall be maintained in a wet condition sufficient to suppress visible dust generation.

5.7 Housekeeping

- All exposed surfaces must be maintained free of accumulation of silica dust. Dry sweeping and the use of compressed air for cleaning surfaces is strictly prohibited. Surfaces and equipment can be cleaned using wet methods or by vacuuming with a vacuum equipped with a HEPA (high efficiency particulate air) filter.

5.8 Hygiene Practices

- Hand and face washing facilities must be provided. Employees should be instructed to use proper hygiene to prevent contamination of cars, homes, and other areas of work. If possible, designate an area where employees can change into clean clothes before leaving the worksite.
- Work clothes cannot be cleaned by blowing or shaking. Instead, they should be vacuumed before removal with a HEPA filter. To prevent ingestion of crystalline silica, there should be separate eating/lunch facilities away from areas of exposure. Food drinks, tobacco products, and unapplied cosmetics should not be used in work areas. To prevent silica dust exposures from leaving the worksite, employees should be instructed to park their cars where they would not be contaminated with silica.

5.9 Personal Protective Equipment

- Respiratory Equipment:
 - Where respiratory protection is required by this section, each employee must be provided with an appropriate respirator that complies with the requirements of 29 CFR 1910.134.
 - Respiratory protection is required:
 - Where specified by Appendix A – OSHA 29 CFR 1926.1153 Table 1.
 - For tasks not listed in Appendix A, or where the engineering controls, work practices, and respiratory protection described in Appendix A are not properly implemented.
 - Where exposures exceed the PEL during periods necessary to install or implement feasible engineering and work practice controls.

- Where exposures exceed the PEL during tasks, such as certain maintenance and repair tasks, for which engineering and work practice controls are not feasible; and
- During tasks for which all feasible engineering and work practice controls have been implemented and such controls are not sufficient to reduce exposures to or below the PEL.
- Employees that require the use of a tight-fitting respirator must be clean-shaven in order to maintain a proper seal and ensure effective respiratory protection. Clean-shaven means no facial hair that could come in contact with the sealing surface of the respirator or any facial hair that could interfere with the function of the respirator valves.
- Protective Clothing
 - Personal protective equipment must be provided at no cost to the employee and consist of appropriate protection for eyes, face, head, extremities, hand, foot, hearing, etc. Employees should be provided with disposable or washable work clothes at the jobsite and be allowed to change into clean clothing before leaving the worksite.

5.10 Exposure Control Plan

- A written exposure control plan that contains at least the following elements will be established and implemented:
 - A description of the tasks in the workplace that involve exposure to respirable crystalline silica.
 - A description of the engineering controls, work practices, and respiratory protection used to limit employee exposure to respirable crystalline silica for each task.
 - A description of the housekeeping measures used to limit employee exposure to respirable crystalline silica; and
 - A description of the procedures used to restrict access to work areas, when necessary, to minimize the number of employees exposed to respirable crystalline silica and their level of exposure, including exposures generated by other employers or sole proprietors.
- Respirable crystalline silica must be included in the program established to comply with the hazard communication standard (HCS) (29 CFR 1910.1200). Each employee must have access to labels on containers of crystalline silica and safety data sheets and is trained in accordance with the provisions of HCS. The following hazards must be addressed, at a minimum:
 - Cancer
 - Lung effects
 - Immune system effects
 - Kidney effects

6 Training

Training must be provided for all employees that perform activities that may create an exposure to crystalline silica. Records of attendance, dates of training, and training material must be documented and retained. Employees will be made aware of the location and availability of the Safety Data Sheets on any products that they may use that contain crystalline silica.

- The training will ensure that employees covered by the written exposure control plan can demonstrate knowledge and understanding of at least the following:
 - The health hazards associated with exposure to respirable crystalline silica (including signs and symptoms of silica related disease).

- Specific tasks in the workplace that could result in exposure to respirable crystalline silica.
- The specific measures taken to protect employees from exposure to crystalline silica, including engineering controls, work practices, and respirators to be used.
- The identity of the designated competent person.
- The purpose and a description of the medical surveillance program.
- The details of the exposure control program for silica dust.

7 Recordkeeping

Accurate records of all air monitoring data, objective data, and medical surveillance shall be maintained as required by 29 CFR 1910.1053 and 29 CFR 1926.1153.

- The results of exposure monitoring to assess employee exposure to respirable crystalline silica will be maintained and include at least the following information:
 - The date of measurement for each sample taken.
 - The task monitored.
 - Sampling and analytical methods used.
 - Number, duration, and results of samples taken.
 - Identify of the laboratory that performed the analysis.
 - Type of personal protective equipment, such as respirators, worn by the employees monitored; and
 - Name, employee identification number, and job classification of all employees represented by the monitoring, indicating which employees were actually monitored.
- Objective data that is used to comply with exposure assessment requirements of the standard will be maintained and will include at least the following information:
 - The crystalline silica-containing material in question.
 - The source of the objective data.
 - The testing protocol and results of testing.
 - A description of the process, task, or activity on which the objective data were based; and
 - Other data relevant to the process, task, activity, material, or exposures on which the objective data were based.
- Medical surveillance records will be maintained and will include the following information about the employee:
 - Name and social security number.
 - A copy of the PLHCPs' and specialists' written medical opinion; and
 - A copy of the information provided to the PLHCPs and specialists.
- All of the records listed above will be maintained and made available in accordance with 29 CFR 1910.1020.

8 References

29 CFR 1926.1153
29 CFR 1910.1053
29 CFR 1910.132
29 CFR 1910.133
29 CFR 1910.134
29 CFR 1910.1200
29 CFR 1910.1020

9 Appendices

9.1 Appendix A – OSHA 29 CFR 1926.1153 Table 1

Exposure Control Methods for Work Involving Crystalline Silica			
Equipment/Task	Engineering and Work Practice Control Methods	Required Respiratory Protection	
		≤ 4 hours/shift	>4 hours/shift
(i) Stationary masonry saws	• Use saw equipped with integrated water delivery system that continuously feeds water to the blade. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None
(ii) Handheld power saws (any blade diameter)	• Use saw equipped with integrated water delivery system that continuously feeds water to the blade. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions:		
	- When used outdoors	None	½ Face Respirator with P100 Filters
	- When used indoors or in an enclosed area	½ Face Respirator with P100 Filters	½ Face Respirator with P100 Filters
(iii) Handheld power saws for cutting fiber-cement board (with blade diameter of 8 inches or less)	For tasks performed outdoors only : • Use saw equipped with commercially available dust collection system. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. • Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency.	None	None
(iv) Walk-behind saws	• Use saw equipped with integrated water delivery system that continuously feeds water to the blade. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions:		
	- When used outdoors	None	None
	- When used indoors or in an enclosed area	½ Face Respirator with P100 Filters	½ Face Respirator with P100 Filters

Exposure Control Methods for Work Involving Crystalline Silica (Continued)			
Equipment/Task	Engineering and Work Practice Control Methods	Required Respiratory Protection	
		≤ 4 hours/shift	>4 hours/shift
(v) Drivable saws	For tasks performed outdoors only: • Use saw equipped with integrated water delivery system that continuously feeds water to the blade. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None
(vi) Rig-mounted core saws or drills	• 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.	None	None
(vii) Handheld and stand-mounted drills (including impact and rotary hammer drills)	• 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.	None	None
(viii) Dowel drilling rigs for concrete	For tasks performed outdoors only: • Use shroud around drill bit with a dust collection system. Dust collector must have a filter with 99% or greater efficiency and a filter cleaning mechanism. • Use a HEPA-filtered vacuum when cleaning holes.	½ Face Respirator with P100 Filters	½ Face Respirator with P100 Filters
(ix) Vehicle-mounted drilling rigs for rock and concrete	• Use dust collection system with close capture hood or shroud around drill bit with a low-flow water spray to wet the dust at the discharge point from the dust collector.	None	None
	OR		
	• Operate from within an enclosed cab and use water for dust suppression on drill bit.	None	None

Exposure Control Methods for Work Involving Crystalline Silica (Continued)			
Equipment/Task	Engineering and Work Practice Control Methods	Required Respiratory Protection	
		≤ 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	½ Face Respirator with P100 Filters
	- When used indoors or in an enclosed area	½ Face Respirator with P100 Filters	½ Face Respirator with P100 Filters
	OR		
	• Use tool equipped with commercially available shroud and dust collection system. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. • 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	½ Face Respirator with P100 Filters
	- When used indoors or in an enclosed area	½ Face Respirator with P100 Filters	½ Face Respirator with P100 Filters
(xi) Handheld grinders for mortar removal (i.e., tuckpointing)	• 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.	½ Face Respirator with P100 Filters	Powered Air-Purifying Respirator (PAPR) with P100 Filters

Exposure Control Methods for Work Involving Crystalline Silica (Continued)			
Equipment/Task	Engineering and Work Practice Control Methods	Required Respiratory Protection	
		≤ 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.	None	None
	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.		
	- When used outdoors	None	None
	- When used indoors or in an enclosed area	None	½ Face Respirator with P100 Filters
(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

Exposure Control Methods for Work Involving Crystalline Silica (Continued)			
Equipment/Task	Engineering and Work Practice Control Methods	Required Respiratory Protection	
		≤ 4 hours/shift	>4 hours/shift
(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
(xv) Large drivable milling machines (half-lane and larger)	For cuts of any depth on asphalt only:	None	None
	• 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.		
	For cuts of four inches or less on any substrate:	None	None
	• 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.		
	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 manufacturers' 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

Exposure Control Methods for Work Involving Crystalline Silica (Continued)			
Equipment/ Task	Engineering and Work Practice Control Methods	Required Respiratory Protection	
		≤ 4 hours/shift	>4 hours/shift
(xvii) 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.	• Operate equipment from within an enclosed cab.	None	None
	• 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
(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.	None	None
	OR • When the equipment operator is the only employee engaged in the task, operate equipment from within an enclosed cab.	None	None

When implementing the control measures specified in Appendix A – OSHA 29 CFR 1926.1153 Table 1, the following should be considered:

- 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.
- For measures implemented that include an enclosed cab or booth, ensure that the enclosed cab or booth:
 - 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).
 - Has heating and cooling capabilities.
- Where an employee performs more than one task included on Appendix A – OSHA 29 CFR 1926.1153 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 the above Appendix 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.

9.2 Appendix B – Silica Exposure Control Plan

Silica Exposure Control Plan (ECP)					
Company:			Date:		
Project:					
On-site Supervisor(s):			Contact:		
Competent Person:			Crew Size:		
Work Start Date:			Duration:		
Scope of work to be completed:					
Job Description: (Those that apply to Silica standard): Check all that apply					
☐	Chipping	☐	Manual Demolition	☐	Shoveling
☐	Sawing (Stationary brick saw)	☐	Gunning / Nozzelling	☐	Grinding
☐	Sawing (Portable power saw)	☐	Mixing	☐	Scaling / Needle Gun
☐	Sawing (Hand saw)	☐	MICON Operation	☐	Heavy equipment (Hoe-ramming)
☐	Drilling (Core bait)	☐	Scraping or sanding	☐	Heavy equipment (Demolition)
☐	Drilling (Impact or rotary hammer)	☐	Pumping	☐	Material transfer (Manual)
☐	Abrasive blasting	☐	Sweeping	☐	Material transfer (Equipment)
☐	Other (please specify):				
Engineering Controls (Isolation from hazard): Check all that apply					
☐	Local Exhaust Ventilation (LEV)	☐	Area misting system	☐	Total enclosure: penetrable
☐	Tool equipped with integrated water delivery system	☐	Manual misting	☐	Total enclosure: non-penetrable
☐	Tool equipped with integrated dust collection system	☐	Negative air machine with filtration	☐	Total enclosure: negative pressure
☐	Cover / guard / shield	☐	Blower with dust sock	☐	Partial enclosure
☐	Other (please specify):				
Administrative Controls (Work practices): Check all that apply					
☐	Barricade with tags diameter: _____ ft.	☐	Schedule work during off-peak hours	☐	Worker training
☐	Signage notifying workers of hazards present	☐	Operate and maintain tools according to manufacturer's instructions	☐	Competent person training
☐	Rotate workers out of area	☐	Communication with others in area	☐	Procedure and SDS's available
☐	Other (please specify):				

Silica Exposure Control Plan (ECP) Continued			
Personal Protective Equipment (PPE): Check all that apply			
☐ Respirator	☐ Disposable coveralls		
Model:	☐ Gloves		
Brand:	☐ Goggles		
Filter:	☐ Other (please specify):		
Hygiene: Check all that apply			
☐ HEPA vacuum	☐ Hand / face wash station	☐ Shower facility	
☐ Other (please specify):			
Housekeeping: Check all that apply			
☐ Labeled / sealed waste receptacle	☐ Wet sweeping	☐ Sweeping compounds	
☐ Containment for silica containing materials	☐ Materials organized and isolated		
☐ Other (please specify):			
Air Monitoring Data: Check all that apply			
☐ Initial monitoring performed	☐ Monitoring being performed	☐ Objective data used	
☐ Scheduled monitoring to be performed			
Silica Sources			
Please list, in detail, the sources of silica for this job:			
SDS's			
☐ All SDS's for silica containing materials are current and available at jobsite.			
☐ SDS's have been reviewed with all affected personnel.			



Exposure Controls

Please describe, in detail, all methods used to protect workers from exposure: (Equipment, schedules, access, PPE, etc.):

Table 1 Verification:

 Check here if performing a task listed in Appendix A – OSHA 29 CFR 1926.1153 Table 1 and will utilize provided controls.

Print Name: _____ Signature: _____ Date: _____

This ECP shall be reviewed with all affected personnel and shall be kept at the jobsite for examination.