



MATERIAL USE GUIDE



As a leader in preblended materials supply and on site delivery systems, SPEC MIX® takes pride in continuing to provide its customers with timely information and solutions to keep projects moving forward in a fashion that addresses worker safety and OSHA Standards. This booklet is designed to inform contractors of certain pertinent information regarding OSHA's New Crystalline Silica Rule for Construction (29 CFR 11926.1153) and to suggest certain controls that should reduce dust exposure when mixing SPEC MIX products at the mix station. For purposes of aiding the overall reduction of dust created from all activities conducted on a jobsite it is important to note that the new OSHA rule is not constrained to any specific construction product and is focused on construction activities that produce large amounts of fine particles, such as sawing, drilling and grinding and not where exposure will remain low under any foreseeable conditions, such as mixing mortar, pouring concrete footers, slab foundation and foundation walls or removing concrete framework.

The information and suggestions set forth in this booklet should not be construed or relied upon as legal advice or as setting forth a comprehensive understanding of the new OSHA rule or compliance with the new rule. Each contractor as an employer in the construction industry should seek the advice of its own professional advisors in understanding the new OSHA rules, its responsibilities under those new rules and the development of a compliance program of workplace controls/methods or other efforts that may be required to satisfy those responsibilities.

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The inserted "Fact Sheet" from OSHA covering the crystalline silica rule for construction is a brief resource to which the contractor may refer for OSHA guidance regarding compliance with the new rule, what activities should be monitored and other related information.)

Industrial Hygiene Assessment 6-8

This section of the booklet contains briefings of assessments obtained by SPEC MIX at certain jobsites where SPEC MIX products and silo systems were on site. SPEC MIX hired ARS Environmental to evaluate four jobsites across the country of different size and with aggregates of different composition to get across section of the average worker's exposure to dust on a jobsite when mixing materials. A contractor may wish to use this information to better understand and evaluate the mixing stations on your projects.

Work Control Practices for SPEC MIX Silo 9-11

SPEC MIX products and silo systems, when used properly and as designed, increase jobsite efficiency and consistency while minimizing exposure to dust. Like any other tool on site, it is of the utmost importance that the user is properly trained on its use to ensure that workers are not putting themselves at risk. This section of the booklet focuses on suggested Work Control Practices Guide intended to help train on-site personnel to use SPEC MIX silo systems and products in a safe way that should reduce unnecessary exposure to dust. Note that not all jobsite conditions are the same and that a contractor will need to assess the conditions at the mixing station to determine what, if any, adjustments need to be made to keep an employee in a position to reduce dust exposure.

Written Control Plan12-13

This section of the booklet contains a suggested Written Control Plan for the SPEC MIX mixing station. Your competent designee may use this form as a template when evaluating the unique mixing conditions on your jobsite to help develop a plan for mixing. This plan can be kept on file and used to educate employees as well as notify safety inspectors to the plan that your company has set in place for mixing materials on site.

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SPEC MIX Preblended Materials15

SPEC MIX products are preblended cement, aggregate and performance admixtures that are specifically designed for the application and consistent from the first to the last batch. This section of the booklet contains a listing of our basic product mixes.

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This section of the booklet includes all of the SPEC MIX silo systems that are available for use on construction sites today. Each silo system offers the contractor specific efficiency advantages to help maximize mixing station efficiency.

SPEC MIX Engineering Controls17

Should a jobsite condition make it necessary to incorporate additional protection, SPEC MIX does offer engineering controls that can be implemented at the contractors' option to help additionally reduce exposure to dust. This section of the booklet identifies two controls. It is important to note that proper training on how to use the silo systems and products can often create an on-site environment that reduces exposure to dust.

SPEC MIX hopes the information in this booklet is helpful. This booklet provides information about SPEC MIX products and their applications and invites customers' attention to the OSHA regulation and compliance guide, which customers should use in their work. Those OSHA documents should provide the basis for a customer's compliance program. This booklet is not itself a compliance guide. All SPEC MIX warranties are set forth in the documents accompanying the sale of the product. This booklet makes no additional warranties express or implied and provides no assurance regarding compliance with any third-party patents. SPEC MIX assumes no legal obligation or liability in connection with this booklet.

OSHA's Crystalline Silica Rule: Construction

OSHA is issuing two standards to protect workers from exposure to respirable crystalline silica—one for construction, and the other for general industry and maritime—in order to allow employers to tailor solutions to the specific conditions in their workplaces.

Who is affected by the construction standard?

About two million construction workers are exposed to respirable crystalline silica in over 600,000 workplaces. OSHA estimates that more than 840,000 of these workers are exposed to silica levels that exceed the new permissible exposure limit (PEL).

Exposure to respirable crystalline silica can cause silicosis, lung cancer, other respiratory diseases, and kidney disease. Exposure can occur during common construction tasks such as using masonry saws, grinders, drills, jackhammers and handheld powered chipping tools; operating vehicle-mounted drilling rigs; milling; operating crushing machines; and using heavy equipment for demolition or certain other tasks.



Photo: NIOSH

Without dust controls, using a handheld power saw to cut concrete can expose workers to high levels of respirable crystalline silica.

The construction standard does not apply where exposures will remain low under any foreseeable conditions; for example, when only performing tasks such as mixing mortar; pouring concrete footers, slab foundation and foundation walls; and removing concrete formwork.

What does the standard require?

The standard requires employers to limit worker exposures to respirable crystalline silica and to take other steps to protect workers.

The standard provides flexible alternatives, especially useful for small employers. Employers can either use a control method laid out in [Table 1*](#) of the construction standard, or they can measure workers' exposure to silica and independently decide which dust controls work best to limit exposures to the PEL in their workplaces.

Regardless of which exposure control method is used, all construction employers covered by the standard are required to:

- Establish and implement a **written exposure control plan** that identifies tasks that involve exposure and methods used to protect workers, including procedures to restrict access to work areas where high exposures may occur.
- Designate a **competent** person to implement the written exposure control plan.
- Restrict **housekeeping** practices that expose workers to silica where feasible alternatives are available.
- Offer **medical exams**—including chest X-rays and lung function tests—every three years for workers who are required by the standard to wear a respirator for 30 or more days per year.

- **Train workers** on work operations that result in silica exposure and ways to limit exposure.
- **Keep records** of workers' silica exposure and medical exams.

What is Table 1?

Table 1 matches common construction tasks with dust control methods, so employers know exactly what they need to do to limit worker exposures to silica. The dust control measures listed in the table include methods known to be effective, like using water to keep dust from getting into the air or using ventilation to capture dust. In some operations, respirators may also be needed.

Employers who follow Table 1 correctly are not required to measure workers' exposure to silica and are not subject to the PEL.

Table 1 Example: Handheld Power Saws

If workers are sawing silica-containing materials, they can use a saw with a built-in system that applies water to the saw blade. The water limits the amount of respirable crystalline silica that gets into the air.

Table 1: Specified Exposure Control Methods When Working with Materials Containing Crystalline Silica			
Equipment/Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hrs/shift	> 4 hrs/shift
(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. <ul style="list-style-type: none"> • When used outdoors. • When used indoors or in an enclosed area. 	None	APF 10
		APF 10	APF 10

Excerpt from Table 1.

*See regulatory text for construction standard, with complete Table 1 at www.osha.gov/silica/SilicaConstructionRegText.pdf.

In this example, if a worker uses the saw outdoors for four hours or less per day, no respirator would be needed. If a worker uses the saw for more than four hours per day or any time indoors, he or she would need to use a respirator with an assigned protection factor (APF) of at least 10. In this case, a NIOSH-certified filtering facepiece respirator that covers the nose and mouth (sometimes referred to as a dust mask) could be used. If a worker needs to use a respirator on 30 or more days a year, he or she would need to be offered a medical exam.

Alternative exposure control methods

Employers who do not use control methods in Table 1 must:

- Measure the amount of silica that workers are exposed to if it may be at or above an **action level of 25 µg/m³** (micrograms of silica per cubic meter of air), averaged over an eight-hour day.
- Protect workers from respirable crystalline silica exposures above the **permissible exposure limit of 50 µg/m³**, averaged over an eight-hour day.
- Use **dust controls** to protect workers from silica exposures above the PEL.
- Provide **respirators** to workers when dust controls cannot limit exposures to the PEL.

When are employers required to comply with the standard?

Construction employers must comply with all requirements of the standard by June 23, 2017, except requirements for laboratory evaluation of exposure samples, which begin on June 23, 2018.

Additional information

Additional information on OSHA's silica rule can be found at www.osha.gov/silica.

OSHA can provide extensive help through a variety of programs, including technical assistance about effective safety and health programs, workplace consultations, and training and education.

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

workplace hazards, provide advice on compliance with OSHA standards, and assist in establishing and improving safety and health management systems. To locate the OSHA On-site Consultation Program nearest you, call 1-800-321-OSHA (6742) or visit www.osha.gov/dcsp/smallbusiness .

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

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

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



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



U.S. Department of Labor

DSG FS-3681 03/2016

As OSHA's new crystalline silica rule for construction was being developed, SPEC MIX took a proactive approach to better understanding how this rule will affect its silo systems and material used on site. In 2016, ARS Environmental Health, Inc. was contracted to run a series of three industrial hygiene assessments of workers' exposure to respirable dust and crystalline silica while using SPEC MIX products and silo systems. A follow up test was run in September of 2017 on one additional jobsite.

2016 Material Mixing Assessment

In 2016, three jobsites (Chicago, IL; Statesboro, GA; Scottsdale, AZ) were selected for evaluating a workers exposure to respirable dust and crystalline silica when using SPEC MIX silo systems and materials. The employees who were working the mixing stations were fitted with a personal sampling pump with a respirable dust cyclone (pictures 1 & 2) and monitored for two continuous days.

These jobsites had crews of between 8 and 12 workers, mixed between 4 and 7 double batches of material per worker and loaded between 1 and 4 bulk bags per day (pictures 3 & 4). The employees who were mixing the materials also performed other jobsite activities including building scaffold, shoveling mortar and grout, driving the forklift, carrying brick and block, cutting brick and block and laying block. They were generally exposed to all conditions on site.

Prior to the assessment, the workers who performed the mixing tasks were given SPEC MIX Work Control Practices training on how to best approach these tasks in a safe and responsible manner. In some cases the silos did employ an upper silo shroud, but not all silos. There were no engineering controls used between the silo and the mixer beyond the standard material dispensing chute.

The analysis of the samples collected showed that the workers monitored on these jobsites had an exposure level below the PEL (PERMISSIBLE EXPOSURE LIMIT) and below the Action Level of OSHA's New Crystalline Silica Rule for Construction in an 8 hour working day (Table 1).



INDUSTRIAL HYGIENE ASSESSMENT

2017 Material Mixing Assessment

In September of 2017, an additional study was commissioned in Dallas, TX using industrial hygienist ARS Environmental Health, Inc. The Dallas market was specifically selected because the mason sand/aggregate in this part of the country is known to have a high content of silica (quartz). The analysis was performed on a large project employing two masonry subcontractors with over 50 workers onsite. The employees who were working the mixing stations were fitted with a personal sampling pump that included a respirable dust cyclone while monitored for two continuous eight hour days.

The employees at the mixing station on this jobsite mixed between 13 and 52 double batches of material and loaded between 7 and 13 bulk bags per day. The employees who were mixing materials spent the majority of their time at the mixing station, mixing materials, loading silos and performing other tasks related to the mixing of materials. They were generally exposed to all conditions on site.

Prior to the assessment, the workers who performed the mixing tasks were given SPEC MIX Work Control Practices training on how to best approach these tasks in a safe and responsible manner. The silos did have engineering controls installed, specifically, an upper silo shroud and a mixer shroud (pictures 1 & 2).

The analysis of the samples collected showed that the workers monitored on this jobsite had an exposure level below the PEL (PERMISSIBLE EXPOSURE LIMIT) and below the Action Level of OSHA's New Silica Rule for Construction in an 8 hour working day (Table 2).

We note that some jobsites will include other activities, such as sawing concrete, which will produce dust that these assessments did not report. Where those activities occur on the jobsite, contractors will need to consider them in making their own assessments.





Table 1

**Airborne Concentrations
Respirable Crystalline Silica and Respirable Dust
Chicago, Illinois Statesboro, Georgia and Scottsdale, Arizona**

June, 2016

ARS Report No. 1640-090216

MASONRY PROJECT TEST SITES	RESPIRABLE DUST (8 HOUR AVG)		RESPIRABLE CRYSTALLINE SILICA (8 HOUR AVG)		
	OSHA PEL (mg/m ³)	Project Average (mg/m ³)	OSHA PEL* (µg/m ³)	OSHA Action Level (µg/m ³)	Project Average (µg/m ³)
Illinois: 2 Day Average	5.0	0.28	50	25	<13**
Georgia: 2 Day Average	5.0	0.93	50	25	13
Arizona: 2 Day Average	5.0	0.12	50	25	<10**
Project 2 Day Average	5.0	0.44	50	25	12

*OSHA PEL (Construction) limits worker exposure to 50 µg of crystalline silica per cubic meter of air (µg/m³) averaged over an 8 hour day (29 CFR 11926.1153)

** Results are below analytical limit of quantification, therefore, none was found.

mg/m³ – milligrams of contaminant per cubic meter of air
µg/m³ – micrograms of contaminant per cubic meter of air.

Crystalline silica analyses by X-Ray Diffraction using TIC-XRD-01/NIOSH 7500
Respirable Particulate analyses by Gravimetric analysis using TIC-GRV-01/NIOSH 0600
Analytical services provided by the Travelers' Industrial Hygiene Laboratory which is Accredited by the American Industrial Hygiene Association.



Table 2

**Worker Exposure to
Respirable Dust and Respirable Crystalline Silica
Waxahachie, Texas**

August 22 - 23, 2017

ARS Report No. 1725-082317

Date	Description	RESPIRABLE DUST (8 HOUR AVG)		RESPIRABLE CRYSTALLINE SILICA (8 HOUR AVG)		
		OSHA PEL (mg/m ³)	Project Average (mg/m ³)	OSHA PEL* (µg/m ³)	OSHA Action Level (µg/m ³)	Project Average (µg/m ³)
	Texas: 2 Day Average	5.0		50	25	<8.2**
8/22/17	Masonry Contractor A	5.0	0.57	50	25	<8.2**
	Masonry Contractor B	5.0	0.62	50	25	<8.2**
8/23/17	Masonry Contractor A	5.0	0.22	50	25	19
	Masonry Contractor B	5.0	1.1	50	25	15

*OSHA PEL (Construction) limits worker exposure to 50 µg of crystalline silica per cubic meter of air (µg/m³) averaged over an 8 hour day (29 CFR 11926.1153)

** Results are below analytical limit of quantification, therefore, none was found.

mg/m³ – milligrams of contaminant per cubic meter of air
µg/m³ – micrograms of contaminant per cubic meter of air.

Crystalline silica analyses by X-Ray Diffraction using TIC-XRD-01/NIOSH 7500
Respirable Particulate analyses by Gravimetric analysis using TIC-GRV-01/NIOSH 0600
Analytical services provided by the Travelers' Industrial Hygiene Laboratory which is Accredited by the American Industrial Hygiene Association.

WORK CONTROL PRACTICES

Reducing Unnecessary Exposure to Dust at the Mixing Station

SPEC MIX silo delivery systems are designed to increase productivity on site while adding to job site safety by reducing physical injury with their ergonomically correct design. The standard gravity or mechanical silos should also limit workers exposure to construction site mixing dust when the following best practices are incorporated into everyday use.

Loading the Silo:

1. Position silo in an area of open wind, avoiding enclosed or confined areas. (If silo enclosures are necessary for winter work, provide engineering controls to minimize dust exposure.)
2. Position the bulk bag over the top of the silo centered over the fill port and safety ring.
3. From the loading platform, position yourself so you are not downwind from the filling port to minimize exposure to dust (picture 1).
4. Lower the bulk bag to a position just above the safety ring.
5. Using the safety hook or your hand, reach under the safety ring and open the b-locks on the inner and outer chutes at the bottom of the bulk bag to dispense material into the silo (picture 2).
6. Climb down the ladder as the material dispenses into the silo to minimize exposure to dust while filling the silo (picture 3).
7. Using the forklift, continue to adjust the position of the bulk bag over the silo to keep the chute of the bulk bag as close as possible to the fill port to reduce dust.

If positioning upwind when loading the silo is not possible or if the contractor should want to use additional measures to reduce exposure to dust when loading a SPEC MIX silo system, the contractor should employ its own engineering controls or may contact SPEC MIX to explore additional manufacturer's engineering controls.



Silo Mixing Procedures:

1. Position silo in an area of open wind, avoiding enclosed or confined areas. (If silo enclosures are necessary for winter work, provide engineering controls to minimize dust exposure.)
2. Position the silo so the mason tender can be positioned with a crosswind over the mixer or upwind to keep dust from blowing into the face of the worker while mixing. Many SPEC MIX silos are equipped with rotating gates that allow for the handle to be moved without moving the silo itself. If necessary, remove the mixer from under the silo and reposition it in a different direction to keep the operator from standing in a downwind position (picture 1).
3. Fill the mixer with sufficient water to receive the material. It is beneficial to keep the initial batch wetter than required for final use to ensure complete hydration of the aggregate, reducing dust when charging the mixer and increasing board life of the final product (picture 2).
4. When opening the gate, take a stance that is away from the discharge of material to limit exposure to dust.
5. Open the gate with even force and only as wide as needed to allow for a good steady flow of material into the silo mixer. Opening at too great of a distance can cause product surges that have the potential to increase airborne particles. When the desired amount of material has been dispensed into the mixer, shut the gate with even force, maintaining distance from the mixer (picture 3).
6. As the wind shifts, make sure to position yourself with a cross wind or upwind to continue to avoid exposure to dust. If necessary, turn the mixer a different direction (picture 4).

If positioning upwind when mixing is not possible or if the contractor should want to use additional measures to reduce exposure to dust when loading a SPEC MIX silo system, the contractor should employ its own engineering controls or may contact SPEC MIX to explore additional manufacturer's engineering controls.

Mixing 80 Pound Bag Product:

Always position the mixer with either a cross wind or upwind from work to keep dust from blowing into the face of the worker while mixing. This may require a change in the mixer position as the wind direction changes daily (picture 5).



WORK CONTROL PRACTICES



If positioning upwind when loading a silo or mixing is not possible or if the contractor should want to use additional measures to reduce exposure to dust when loading a SPEC MIX silo system, the contractor should employ its own engineering controls or may contact SPEC MIX to explore additional manufacturer's engineering controls.

SPEC MIX Silo Upper Shroud:

1. Install the Silo Upper Shroud into the fill port at the top of the silo. The end of the tube with the skirt should be positioned just above the top of the silo and draped down to close any air gaps between the Upper Dust Shroud and the silo (picture 1).
2. Position the bulk bag over the Silo Upper Shroud and lower the bulk bag so it compresses the upper shroud.
3. Reach under the safety ring, pull the upper dust shroud down from the bulk bag and release the inner and outer b-lock by hand or with the safety hook (picture 2).
4. Release the upper dust shroud to allow it to compress against the bulk bag.
5. Climb down the ladder as the material dispenses into the silo to minimize exposure to dust while filling the silo (picture 3).
6. Reposition the bulk bag as needed to keep a tight seal between the upper dust shroud and the bulk bag.

SPEC MIX Mixer Shroud:

1. Install the Mixer Shroud to the silo slide gate chute ring.
2. Cut the chute of the Mixer Shroud at the desired height to allow the shroud to hang over the mortar mixer so that the shroud falls down over the sides of the mixer drum approximately 2" in every direction (picture 4).
3. Strap the chute of the mixer shroud over the silo chute on the chute ring.

Additional Helpful Mixing Tips:

1. If the mixer cannot be repositioned, the use of a wind screen to block wind direction that is creating an upwind condition can be helpful.
2. When mixing in enclosed areas, the use of an evacuation fan can be helpful.

Date: _____

Project: _____

Address: _____

City/State/Zip: _____

Competent Person: _____

Contractor: _____

Address: _____

City/State/Zip: _____

Contact #: _____

I. Description of Task—Mortar Mixing:

- Mixing SPEC MIX materials utilizing a SPEC MIX silo material delivery system.
- Mixing SPEC MIX 80 pound bag materials utilizing a paddle/barrel mixer.

II. SPEC MIX Preblended Materials used on site:

- Masonry Mortar
- Masonry Grout
- Stucco
- Other (description of product(s) used):

III. SPEC MIX Silo Systems in Use:

- G7000 Silo
- Ten Bag Silo
- Split Bell Silo
- Load N Go
- Masons Mix Silo
- PA4000
- PA1000
- D2W Silo Continuous Mixer

IV. SPEC MIX Engineering Controls in Use:

- Silo Shroud
- Mixer Shroud
- Other _____

WRITTEN EXPOSURE CONTROL PLAN

VI. Contractor Administered Engineering/Work Practice Control Plans

- Engineering Controls (ie: Windscreens or Fans, etc.)
- Work Practice Controls (ie: Positioning of worker or worker rotation, etc.)
- Other _____

VII. Respiratory Protection Program (type):

VIII. Housekeeping Measures Implemented on Jobsite:

IX. Restrictive Access Procedures:

X. Description of Additional Mixing Systems and Procedures:

XI. Employee Exposure Training Program:

- Review SPEC MIX Work Practices Control Guide for Mixing Materials.
 - Other _____
-
-

TRAINING ATTENDANCE SHEET

Jobsite/Location:	
Training Date:	
Name of Trainer (please print):	
Signature of Trainer:	

Name of Training Course or Description of Course Content:

SPEC MIX Work Control Practices Training

Employee Name (print)	Title or Job Function	Signature	Date

PREBLENDED MATERIALS - APPENDIX A

MASONRY MORTARS



PAVING MORTARS



MASONRY GROUTS



STUCCO BASE COATS



ADHERED VENEER MORTARS



SPECIALTY PRODUCTS



G7000
SILO SYSTEM



D2W
CONTINUOUS MIXING SYSTEM



LOAD N GO®
SILO SYSTEM



TEN BAGGER
SILO SYSTEM



SPLIT SILO
SILO SYSTEM



PA1000
POWER AUGER SYSTEM



PA4000
POWER AUGER SYSTEM



MASONS MIX
POWER AUGER SYSTEM



UPPER SILO SHROUD



MIXER SHROUD



NOTES

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