RESPIRABLE CRYSTALLINE SILICA…

An unknown number of workers are exposed every year to the hazards of respirable crystalline silica. Some of these workers will develop a serious illness called *Silicosis*.

Working with and around silica containing materials should be taken seriously as a dangerous business. This is no place to cut corners or cheat on safety. You should pay attention and know what it takes to stay safe…

Work Smart, Build Safe!

This publication includes:

1. The purpose of the Occupational Safety and Health Administration (OSHA) and its enforcement duty under law.
2. Introduction to respirable crystalline silica and its health effects.
3. Recognition and avoidance of common respirable silica hazards.
4. Procedures for preventing exposure to respirable crystalline silica.
5. Engineering controls, work practices and personal protective equipment used to control silica hazards.
6. Sample *Silica Safety Program* to include *Written Exposure Control Plans* and *Competent Person* responsibilities.
7. Medical surveillance guidelines for silica.
8. OSHA Standards, Fact Sheets, and Compliance Guides

OSHA DISCLAIMER

This material was produced under grant number SH-05009-SH8 from the Occupational Safety and Health Administration, U.S. Department of Labor. It does not necessarily reflect the views or policies of the U.S. Department of Labor, nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government.

Acknowledgements & Credits

The content of this *Silica Hazards in Construction* book is primarily derived from OSHA's respirable crystalline silica standards and NIOSH publications. Other contributions come from OSHA Letters of Interpretation, compliance guides, OSHA Fact Sheets, quick cards and posters.

We hope you enjoy the course!

Reasons for Development

- Protect the safety and health of the worker.
- Train competent persons to perform frequent and regular inspections of the jobsites, materials and equipment.
- Help employers understand and react to silica hazards in construction and comply with Federal rules and regulations.

Employers have the responsibility to:

(1) Develop safety programs to comply with OSHA standards.

(2) Provide for frequent and regular inspections of the jobsites, materials, and equipment to be made by competent persons designated by the employer.

(3) Not allow the use of any machinery, tool, material, or equipment which is not in compliance with any applicable requirement of OSHA. Such machine, tool, material, or equipment shall either be identified as unsafe by tagging or locking the controls to render them inoperable or shall be physically removed from its place of operation.

(4) Permit only those employees qualified by training or experience to operate equipment and machinery.

Employer's responsibility to train workers:

(1) The employer should avail himself of the safety and health training programs OSHA provides.

(2) The employer shall instruct each employee in the recognition and avoidance of unsafe conditions and the regulations applicable to the work environment to control or eliminate any hazards or other exposure to illness or injury.

Course Goal

The goal of this course is to enhance communication of respirable crystalline silica hazards between employers and employees and to prevent illness. At the conclusion, each course participant will possess the confidence to recognize and avoid unsafe conditions and behaviors as well as be able to identify regulations applicable to silica hazards in construction. Participants will be able to:

- Train competent persons.
- Become more aware of silica hazards in construction and function within a safety & health management system.

Course Participants Will Learn

- Occupational Safety & Health Administration (OSHA) respirable crystalline silica standards.
- How to identify existing and foreseeable respirable crystalline silica hazards, and select appropriate risk control methods from the hierarchy of controls, including personal protective equipment.
- How and when to make managerial decisions, such as how to implement a silica *Written Exposure Control Plan*.

Intended Audience

The target audience is the construction employer, manager, employee or employee representative who, as part of a safety and health program, would either be acting to fulfill the requirements of a competent person (to conduct frequent and regular inspections of a jobsite) or performing safety and health evaluations for their member employees and performing training as described in OSHA's construction safety & health standard 29 CFR 1926. This audience may include:

- Jobsite Competent Persons
- Qualified Persons
- Site Supervisors
- Owners

Table of Contents

Discussion Points

- **What is crystalline silica?**
- **What are the hazards of crystalline silica?**
- **What are the symptoms of silicosis?**
- **Where are construction workers exposed to crystalline silica?**

What is Crystalline Silica?

Crystalline silica is a common mineral found in many naturally occurring and man-made materials used at construction sites. Materials like sand, concrete, brick, block, stone and mortar contain crystalline silica.

Quartz

Silica is a general term for the compound silicon dioxide (SiO_2) and is the most common component of sand.

Quartz is the most common form of crystalline silica. Cristobalite and tridymite are two other forms of crystalline silica. All three forms may become respirable size particles when workers chip, cut, drill, or grind objects that contain crystalline silica.

Drilling into cement causes respirable silica.

Sawing into concrete block causes respirable silica.

In its crystalline form (Quartz, Cristobalite or Tridymite) silica can be broken down into very small particles and inhaled deep into the lungs. These small particles are called respirable silica and the focus of the Occupational Safety and Health Administration (OSHA).

Respirable Crystalline Silica – very small particles typically at least 100 times smaller than ordinary sand found on beaches or playgrounds – is generated by high-energy operations like cutting, sawing, grinding, drilling and crushing stone, rock, concrete, brick, block and mortar, or when abrasive blasting with sand.

Working with block and mortar causes respirable silica.

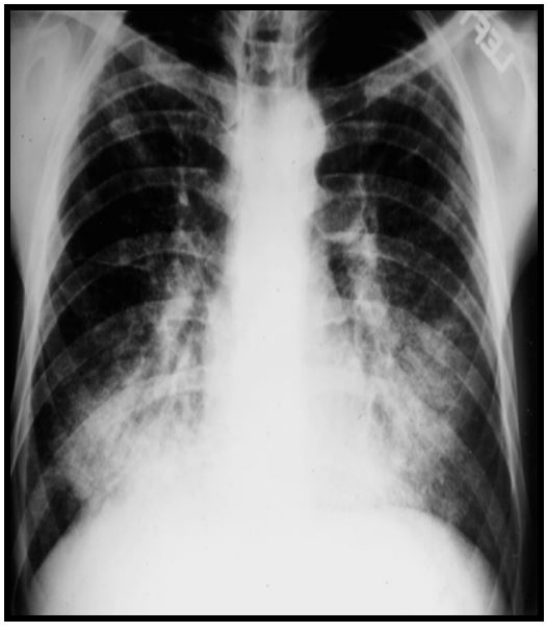
What are the Hazards of Crystalline Silica?

Crystalline silica has been classified as a human lung carcinogen [1], [2], [3].

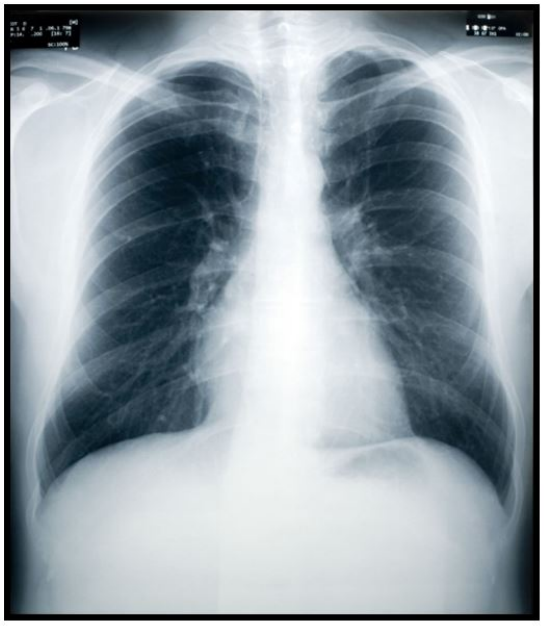
Breathing in very small ("respirable") crystalline silica particles, causes multiple diseases, including **silicosis**, an incurable lung disease that leads to disability and death. Respirable crystalline silica also causes **lung cancer**, **chronic obstructive pulmonary disease (COPD)**, and **kidney disease**. Exposure to respirable crystalline silica is related to the development of autoimmune disorders and cardiovascular impairment. These occupational diseases are life-altering and debilitating disorders that affect thousands of workers annually.

SILICOSIS

When silica dust enters the lungs, it causes the formation of scar tissue, which makes it difficult for the lungs to take in oxygen. There is no cure for silicosis. Since silicosis affects lung function, it makes one more susceptible to lung infections like **tuberculosis**. In addition, smoking irritates the lungs and adds to the damage caused by breathing silica dust.



Formation of Scar Tissue



Healthy Lungs

[1] **International Agencies for Research on Cancer (IARC). Monographs on the Evaluation of Carcinogenic Risks to Humans / Silica, Some Silicates, Coal Dust and para Aramid Fibrils (1997).**

[2] **National Toxicology Program (NTP). Report on Carcinogens, Eleventh Edition. Silica, Crystalline (Respirable Size). U.S. Department of Health and Human Services, Public Health Service, National Toxicology Program (2005).**

[3] **The National Institute for Occupational Safety and Health (NIOSH). NIOSH Hazard Review: Health Effects of Occupational Exposure to Respirable Crystalline Silica [DHHS (NIOSH) Publication No. 2002-129] (2002).**

Symptoms of Silicosis

Silicosis typically occurs after 10 years of occupational exposure to respirable crystalline silica. Symptoms may or may not be obvious; therefore, workers need to have a chest x-ray to determine if there is lung damage. As the disease progresses, the worker may experience shortness of breath upon exercising. In the later stages, the worker may experience fatigue, extreme shortness of breath, chest pain, or respiratory failure.

Types of Silicosis:

- **Chronic/classic silicosis**, the most common, occurs after 15–20 years of moderate to low exposures to respirable crystalline silica. Symptoms associated with chronic silicosis may or may not be obvious; therefore, workers need to have a chest x-ray to determine if there is lung damage. As the disease progresses, the worker may experience shortness of breath upon exercising and have clinical signs of poor oxygen/carbon dioxide exchange. In the later stages, the worker may experience fatigue, extreme shortness of breath, chest pain, or respiratory failure.
- **Accelerated silicosis** can occur after 5–10 years of high exposures to respirable crystalline silica. Symptoms include severe shortness of breath, weakness, and weight loss. The onset of symptoms takes longer than in acute silicosis.
- **Acute silicosis** occurs after a few months or as long as 2 years following exposures to extremely high concentrations of respirable crystalline silica. Symptoms of acute silicosis include severe disabling shortness of breath, weakness, and weight loss, which often leads to death.

Definition of Respirable

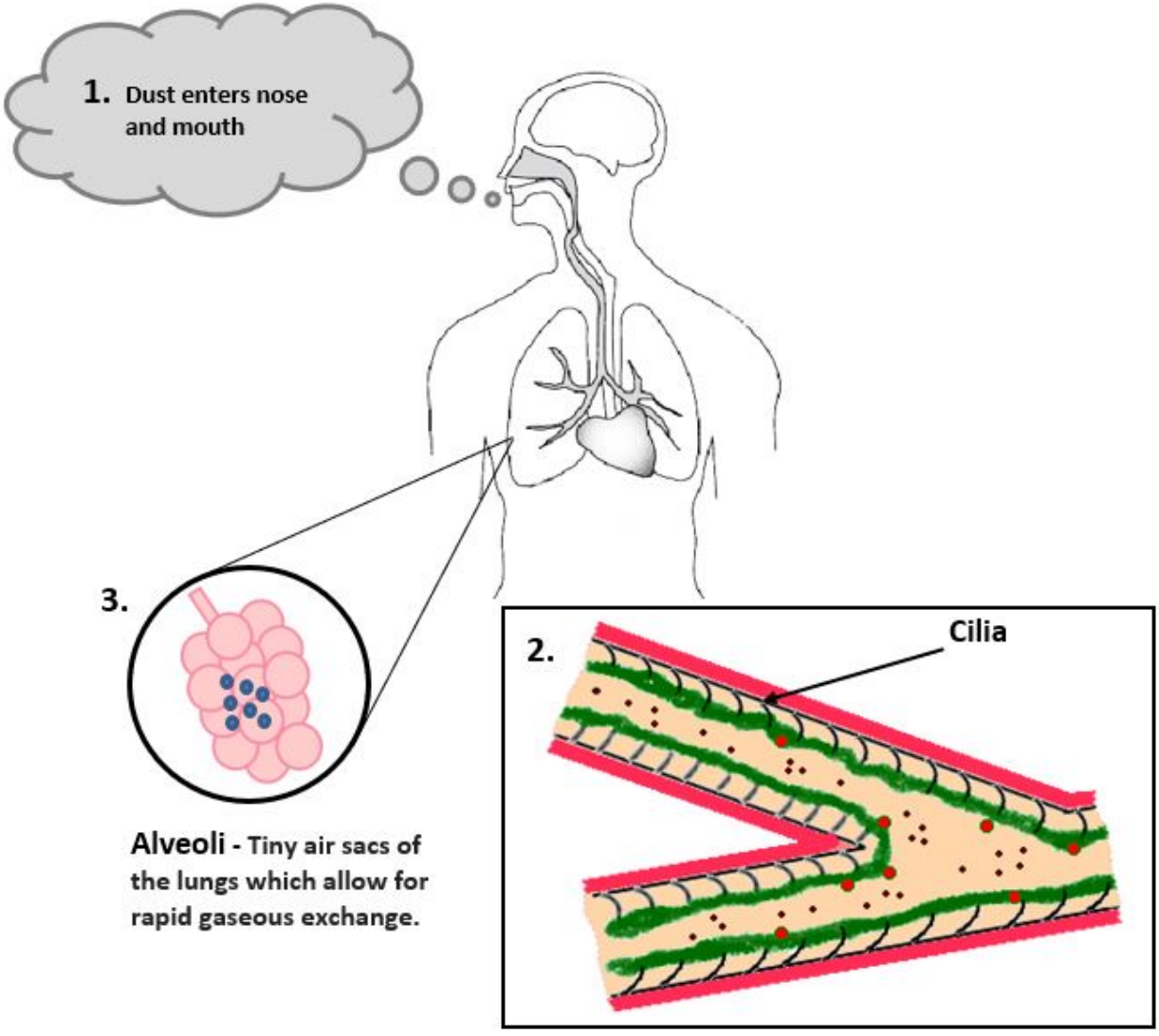
Dust particles that can go past the nose and mouth and enter deep into the respiratory system are considered to be respirable; these particles are less than 10 microns (µm) in diameter.

A micron is 1 millionth of a meter (1/96,000 of an inch).

Human hair is between 80 – 120 microns (µm) in diameter.
Dust particles that are less than 10 microns (µm) in diameter
are invisible to the eye and require a microscope to see them.

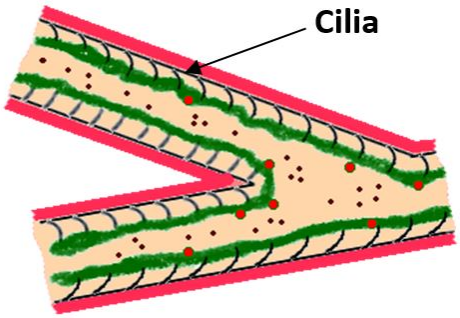
How Silicosis Develops

1. As dust enters the nose and mouth, it is trapped in a mucus membrane that lines our nose and throat.
2. Dust particles that are large, get stuck in the mucus membrane and are removed by small hairs called cilia that pushes these dust particles up the throat and are eventually coughed up or swallowed.
3. Small (respirable) sized dust particles pass through the lungs and enter the alveoli. Once inside, the tissue of the lungs become inflamed and tiny fibers grow around the silica particles, called nodules. The lungs become scar; this condition is called silicosis.



Effects of Smoking

Smoking paralyses the body's natural defense, specifically the cilia (tiny hairs that filter out dust); smoking causes the cilia to relax and not perform its function as a dust capturing mechanism. This means that more dust can get inhaled into the lungs where damage can occur.



Smoking causes the cilia in our body's air passages to not work properly.

Smoking increases the chances of illness if you work around hazardous substances.

Diagnosing and Treating Silicosis

If you work or have worked in an occupation with exposure to inhaled silica and have a cough, phlegm, or breathing difficulty, you should be evaluated for silicosis.

A medical examination that includes a complete work history and a chest X-ray and lung function test is the only sure way to determine if a person has silicosis. Workers who believe they are overexposed to silica dust should visit a doctor who knows about lung diseases.

There is no cure for silicosis. Prevention is still the best way to avoid the disease. Once silicosis has developed, your doctor will assess the degree of lung damage with tests. Some people may need urgent treatment with oxygen and support for breathing. Others may need medicines to decrease sputum production, such as inhaled steroids. Some may need inhaled bronchodilators, which relax the air tubes.

Special doctors referred to as "B" Readers are trained to identify diseases of the lungs caused by dust exposure.

LUNG CANCER

Exposure to respirable crystalline silica increases the risk of developing lung cancer. Lung cancer is a disease where abnormal cells grow uncontrollably into tumors, interfering with lung function. The abnormal cancer cells can also travel ("metastasize") and cause damage to other parts of the body. Most cases are not curable.

CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

Exposure to respirable crystalline silica increases the risk of other lung diseases, primarily COPD, which includes emphysema and chronic bronchitis. The main symptom of COPD is shortness of breath due to difficulty breathing air into the lungs. COPD is not usually reversible and may worsen over time.

KIDNEY DISEASE

Studies of workers exposed to respirable crystalline silica have found that these workers are at increased risk of developing kidney disease. For instance, kidney failure has been observed among workers with high silica exposure, such as in abrasive blasters who also were suffering from silicosis.

Where are Construction Workers Exposed to Respirable Crystalline Silica?

An estimated 2.3 million people in the U.S. are exposed to silica at work. Exposure occurs during many different construction activities, including:

- Abrasive blasting with sand to remove paint and rust from bridges, tanks, concrete structures, and other surfaces
- Jack hammering
- Rock/well drilling
- Concrete mixing
- Concrete drilling
- Brick and concrete block cutting and sawing
- Tuck pointing
- Tunneling operations

DANGER! Workers exposed to respirable crystalline silica.

Discussion Points

- **OSHA's purpose and employer duty to provide a safe place of employment**
- **Employer/employee rights & responsibilities under the OSHAct**
- **Refusing to work because conditions are dangerous**
- **OSHA's multi-employer worksite citation policy**
- **Rights as a whistleblower**
- **OSHA policy on providing and paying for personal protective equipment**
- **Reporting of fatalities and catastrophes**
- **Employee Exposure and Medical Records**

Occupational Safety & Health Administration (OSHA)

OSHA's Purpose…

To assure safe and healthful working conditions for working men and women; by authorizing enforcement of the standards developed under the Act; by assisting and encouraging the States in their efforts to assure safe and healthful working conditions; by providing for research, information, education, and training in the field of occupational safety and health; and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, that this Act may be cited as the "Occupational Safety and Health Act of 1970" (OSHAct).

General Duty Clause…

(a) Each employer

(1) *Shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees.*

(2) *Shall comply with occupational safety and health standards promulgated under this Act.*

(b) ***Each employee*** *shall comply with occupational safety and health standards and all rules, regulations, and orders issued pursuant to this Act which are applicable to his own actions and conduct.*

Job Safety and Health **IT'S THE LAW!**	OSHA **Occupational Safety & Health Administration** **U.S. Department of Labor**

EMPLOYEES:

- You have the right to notify your employer or OSHA about workplace hazards. You may ask OSHA to keep your name confidential.
- You have the right to request an OSHA inspection if you believe that there are unsafe and unhealthful conditions in your workplace. You or your representative may participate in that inspection.
- You can file a complaint with OSHA within 30 days of retaliation or discrimination by your employer for making safety and health complaints or for exercising your rights under the OSH Act.
- You have a right to see OSHA citations issued to your employer. Your employer must post the citations at or near the place of the alleged violation.
- Your employer must correct workplace hazards by the date indicated on the citation and must certify that these hazards have been reduced or eliminated.
- You have the right to copies of your medical records or records of your exposure to toxic and harmful substances or conditions.
- Your employer must post this notice (OSHA 3165-12-06R) in your workplace.
- You must comply with all occupational safety and health standards issued under the *OSH Act* that apply to your own actions and conduct on the job.

EMPLOYERS:

- You must furnish your employees a place of employment free from recognized hazards.
- You must comply with the occupational safety and health standards issued under the *OSH Act*.

This free poster available from OSHA - *the Best Resource for Safety and Health*

Free assistance in identifying and correcting hazards or complying with standards is available to employers, without citation or penalty, through OSHA-supported consultation programs in each state.

1-800-321-OSHA
www.osha.gov

OSHA 3165-12-06R

Refusing to Work Because Conditions are Dangerous

Workers have the right to refuse to perform a task if they believe in good faith that they are exposed to an *imminent danger*. "Good faith" means that even if an imminent danger is not found to exist, the worker had reasonable grounds to believe that it did exist.

Your right to refuse to perform a task is protected if all of the following conditions are met:

- ☐ Where possible, you have asked the employer to eliminate the danger, and the employer failed to do so; and
- ☐ You refused to work in "good faith." This means that you must genuinely believe that an imminent danger exists. Your refusal cannot be a disguised attempt to harass your employer or disrupt business; and
- ☐ A reasonable person would agree that there is a real danger of death or serious injury (illness); and
- ☐ There isn't enough time, due to the urgency of the hazard, to get it corrected through regular enforcement channels, such as requesting an OSHA inspection.

When all of these conditions are met, then you may take the following steps:

- ☐ Ask your employer to correct the hazard;
- ☐ Ask your employer for other work;
- ☐ Tell your employer that you won't perform the work unless and until the hazard is corrected; and
- ☐ Remain at the worksite until ordered to leave by your employer.

IF	**THEN**
You believe working conditions are unsafe or unhealthful.	Call your employer's attention to the problem.
Your employer does not correct the hazard or disagrees with you about the extent of the hazard.	You may file a complaint with OSHA.
Your employer discriminates against you for refusing to perform the dangerous work.	Contact OSHA immediately. (800) 321-OSHA

OSHA's Multi-Employer Worksite Citation Policy

When on a construction jobsite, multiple employers and employees are exposed to a variety of hazards that may or may not have been created or under the control of any one employer. In this *"multi-employer"* environment, more than one employer may be citable for a hazardous condition that violates an OSHA standard.

OSHA classifies employers into one or more of four categories – the ***creating, exposing, correcting, and controlling employers*** – to determine if a citation will be issued.

The Creating Employer: an employer who causes a hazardous condition that violates an OSHA standard. An employer who creates the hazard is citable even if the only employees exposed in the workplace are those who work for other employers.

The Exposing Employer: an employer whose own employees are exposed to the hazard.

If the exposing employer created the violation, he/she is citable for the violation as a creating employer.

If the violation was created by another employer, the exposing employer is citable if he/she:

1) Knew of the hazardous condition or failed to exercise reasonable diligence to discover the condition, and
2) Failed to take steps to protect his/her employees.

If the exposing employer has the authority to correct the hazard, he/she must do so.

If he/she lacks the authority to correct the hazard, he/she is citable if he/she fails to do each of the following:

1) Ask the creating and/or controlling employer to correct the hazard
2) Inform his/her employees of the hazard, and
3) Take reasonable alternative protective measures.

   NOTE: In some circumstances, the employer is citable for failing to remove his/her employees from the job to avoid the hazard.

The Correcting Employer: an employer who is responsible for correcting a hazard on the exposing employer's worksite, usually occurring while the correcting employer is installing and/or maintaining safety/health equipment. The correcting employer must exercise reasonable care in preventing and discovering violations and meet his/her obligation of correcting the hazard.

The Controlling Employer: an employer who has general supervisory authority over the worksite, including the power to correct safety and health violations or requiring others to correct them. A controlling employer must exercise reasonable care to prevent and detect violations on the site.

Rights as a Whistleblower

You may file a complaint with OSHA if your employer retaliates against you by taking unfavorable personnel action because you engaged in protected activity relating to workplace safety and health, commercial motor carrier safety, pipeline safety, air carrier safety, nuclear safety, the environment, asbestos in schools, corporate fraud, SEC rules or regulations, railroad carrier safety or security, or public transportation agency safety or security.

Whistleblower Laws Enforced by OSHA

Each law requires that complaints be filed within a certain number of days after the alleged retaliation.

You may file complaints by telephone or in writing under the:

- Occupational Safety and Health Act (30 days)
- Surface Transportation Assistance Act (180 days)
- Asbestos Hazard Emergency Response Act (90 days)
- International Safe Container Act (60 days)
- Federal Rail Safety Act (180 days)
- National Transit Systems Security Act (180 days)

Under the following laws, complaints must be filed in writing:

- Clean Air Act (30 days)
- Comprehensive Environmental Response, Compensation and Liability Act (30 days)
- Energy Reorganization Act (180 days)
- Federal Water Pollution Control Act (30 days)
- Pipeline Safety Improvement Act (180 days)
- Safe Drinking Water Act (30 days)
- Sarbanes-Oxley Act (90 days)
- Solid Waste Disposal Act (30 days)
- Toxic Substances Control Act (30 days)
- Wendell H. Ford Aviation Investment and Reform Act for the 21st Century (90 days)

Unfavorable Personnel Actions

Your employer may be found to have retaliated against you if your protected activity was a contributing or motivating factor in its decision to take unfavorable personnel action against you. Such actions may include:

- Firing or laying off
- Blacklisting
- Demoting
- Denying overtime or promotion
- Disciplining
- Denying benefits
- Failing to hire or rehire
- Intimidation
- Reassignment affecting promotion prospects
- Reducing pay or hours

Filing a Complaint

If you believe that your employer retaliated against you because you exercised your legal rights as an employee, contact your local OSHA office as soon as possible, because you must file your complaint within the legal time limits. OSHA conducts an in-depth interview with each complainant to determine whether to conduct an investigation.

For more information, call your closest OSHA Regional Office. Addresses, fax numbers and other contact information for these offices can be found on OSHA's website, www.osha.gov, and in local directories. Some complaints must be filed in writing and some may be filed verbally (call your local OSHA office for assistance).

Written complaints may be filed by mail (recommend certified mail), fax, or hand-delivered during business hours. The date postmarked, faxed or hand delivered is considered the date filed.

If retaliation for protected activity relating to occupational safety and health issues takes place in a state that operates an OSHA-approved state plan, the complaint should be filed with the state agency, although persons in those states may file with Federal OSHA at the same time. Although the Occupational Safety and Health Act covers only private sector employees, state plans also cover state and local government employees.

Rights as a Whistleblower

How OSHA Determines Whether Retaliation Took Place

The investigation must reveal that:

- The employee engaged in protected activity;
- The employer knew about the protected activity;
- The employer took an adverse action; and
- The protected activity was the motivating factor (or under some laws, a contributing factor) in the decision to take the adverse action against the employee.

If the evidence supports the employee's allegation and a settlement cannot be reached, OSHA will issue an order requiring the employer to reinstate the employee, pay back wages, restore benefits, and other possible remedies to make the employee whole.

Limited Protections for Employees Who Refuse to Work

You have a limited right under the OSH Act to refuse to do a job because conditions are hazardous. You may do so under the OSH Act only when (1) you believe that you face death or serious injury (and the situation is so clearly hazardous that any reasonable person would believe the same thing); (2) you have tried to get your employer to correct the condition, and there is no other way to do the job safely; and (3) the situation is so urgent that you do not have time to eliminate the hazard through regulatory channels such as calling OSHA.

Regardless of the unsafe condition, you are not protected if you simply walk off the job. For details, see www.osha.gov. OSHA cannot enforce union contracts or state laws that give employees the right to refuse to work.

Whistleblower Protections in the Transportation Industry

Employees whose jobs directly affect commercial motor vehicle safety are protected from retaliation by their employers for refusing to violate or for reporting violations of Department of Transportation (DOT) motor carrier safety standards or regulations, or refusing to operate a vehicle because of such violations or because they have a reasonable apprehension of death or serious injury.

Similarly, employees of air carriers, their contractors or subcontractors who raise safety concerns or report violations of FAA rules and regulations are protected from retaliation, as are employees of owners and operators of pipelines, their contractors and subcontractors who report violations of pipeline safety rules and regulations. Employees involved in international shipping who report unsafe shipping containers are also protected. In addition, employees of railroad carriers or public transportation agencies, their contractors or subcontractors who report safety or security conditions or violations of federal rules and regulations relating to railroad or public transportation safety or security are protected from retaliation.

Whistleblower Protections for Voicing Environmental Concerns

A number of laws protect employees who report violations of environmental laws related to drinking water and water pollution, toxic substances, solid waste disposal, air quality and air pollution, asbestos in schools, and hazardous waste disposal sites. The Energy Reorganization Act protects employees who raise safety concerns in the nuclear power industry and in nuclear medicine.

Whistleblower Protections When Reporting Corporate Fraud

Employees who work for publicly traded companies or companies required to file certain reports with the Securities and Exchange Commission are protected from retaliation for reporting alleged mail, wire, or bank fraud; violations of rules or regulations of the SEC, or federal laws relating to fraud against shareholders.

More Information

To obtain more information on whistleblower laws, go to www.osha.gov, and click on the link for "Whistleblower Protection."

Personal Protective Equipment (PPE)

PPE is equipment worn to minimize exposure to a variety of hazards. Examples include items such as personal fall arrest systems, gloves, foot and eye protection, hearing protection, hard hats and respirators.

Employer Obligations	Worker Responsibility
☐ Perform a "hazard assessment" of the workplace to identify and control physical and health hazards. ☐ Identify and provide appropriate PPE for employees. ☐ Train employees in the use and care of the PPE. ☐ Maintain PPE, including replacing worn or damaged PPE. ☐ Periodically review, update and evaluate the effectiveness of the PPE program.	☐ Properly wear PPE. ☐ Attend training sessions on PPE. ☐ Care for, clean and maintain PPE. ☐ Inform a supervisor of the need to repair or replace PPE. ***NOTE:*** *The employer must pay for replacement PPE, except when the employee has lost or intentionally damaged the PPE.*

Employers Must Pay for Personal Protective Equipment (PPE)

With few exceptions, OSHA requires employers to pay for personal protective equipment used to comply with OSHA standards; employers cannot require workers to provide their own PPE. Even when a worker provides his or her own PPE, the employer must ensure that the equipment is adequate to protect the worker from hazards at the workplace.

Employers are not required to pay for:

- ***Everyday clothing;*** such as long-sleeve shirts, long pants and normal work boots (including protective toe).
- ***Ordinary clothing;*** such as winter coats, jackets and gloves.

Reporting of Fatalities and Catastrophes

OSHA Standard, 29 CFR Subpart 1904.39, *Reporting Fatality, Injury and Illness Information to the Government* requires that employers report all work related fatalities within eight (8) hours and all work-related inpatient hospitalizations, all amputations and all losses of an eye within 24 hours. Employers must orally report the fatality/hospitalization by telephone or in-person to the OSHA Area Office or to the State Plan Office that is nearest to the site of the incident. Employers may also use the OSHA toll-free central telephone number:

1-800-321-OSHA (1-800-321-6742).

Employee Exposure and Medical Records

Workers with possible exposure to or uses toxic substances or harmful physical agents on job-sites have rights to access exposure records. These rights and responsibilities can be found in OSHA's standard 29 CFR 1926.33 (see 29 CFR 1910.1020 – Access to Employee Exposure and Medical Records).

Retention of Medical Records…

- ✓ Employee medical records must be retained for at least the duration of the employee's employment plus 30 years.
- ✓ Employee exposure records for at least 30 years (personal air monitoring results).
- ✓ Background data related to environmental, or workplace, monitoring or measuring—such as laboratory reports and worksheets—must only be retained for 1 year, so long as you preserve certain interpretive documents relevant to the interpretation of the data for 30 years.

Employee exposure and medical records must be retained by the employer.

Discussion Points

- **Overview of industry standards for respirable crystalline silica**
- **Scope of OSHA construction standards for respirable crystalline silica**
- **Definitions**
- **OSHA compliance options**
    - **Specific exposure controls methods**
    - **Alternative exposure control methods**
        - **Permissible Exposure Limit (PEL)**
        - **Exposure Assessment**
        - **Methods of Compliance**

Image Source: www.osha.gov/topics/silica, crystalline

Go to **www.osha.gov** - search topic **Silica, Crystalline** for a complete list of OSHA standards, fact sheets, compliance guides and other tools on respirable crystalline silica.

OSHA Standards for Respirable Crystalline Silica:

- Construction – 29 CFR 1926.1153
- General Industry & Maritime – 29 CFR 1910.1053

Scope, 29 CFR 1926.1153 – Respirable Crystalline Silica in Construction

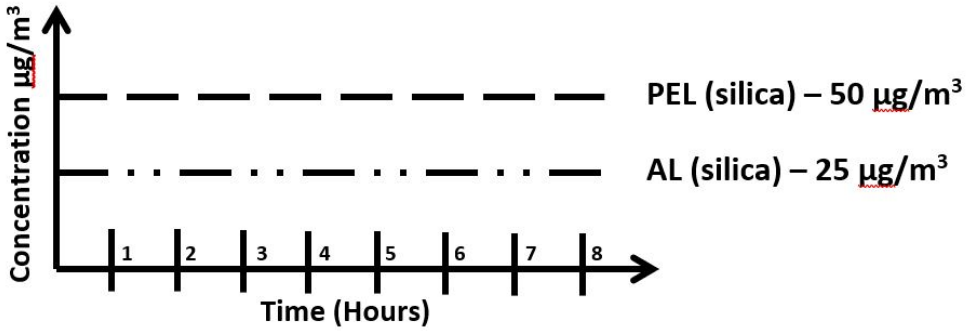
OSHA standards in construction applies to all occupational exposures to respirable crystalline silica in construction work, except where employee exposure will remain below 25 micrograms per cubic meter of air (25 µg/m^3) as an 8-hour time-weighted average (TWA) under any foreseeable conditions.

Definitions

Action level means a concentration of airborne respirable crystalline silica of 25 µg/m^3, calculated as an 8-hour TWA.

8-Hour Time Weighted Average (TWA) is the average employee exposure over an 8-hour period, based on chemical measurements close to the worker. The measured level may sometimes go above the TWA value, as long as the 8-hour average stays below it. Most chemicals with Permissible Exposure Limits (PELs) have a TWA value.

NOTE: The Permissible Exposure Limit (PEL) for respirable crystalline silica is 50 µg/m^3, calculated as an 8-hour TWA.



Competent person means an individual who is capable of identifying existing and foreseeable respirable crystalline silica hazards in the workplace and who has authorization to take prompt corrective measures to eliminate or minimize them. The competent person must have the knowledge and ability necessary to fulfill the responsibilities set forth in 29 CFR 1926.1153(g).

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

High-efficiency particulate air [HEPA] filter means a filter that is at least 99.97 percent efficient in removing mono-dispersed particles of 0.3 micrometers in diameter.

Objective data means information, such as air monitoring data from industry-wide surveys or calculations based on the composition of a substance, demonstrating employee exposure to respirable crystalline silica associated with a particular product or material or a specific process, task, or activity. The data must reflect workplace conditions closely resembling or with a higher exposure potential than the processes, types of material, control methods, work practices, and environmental conditions in the employer's current operations.

Physician or other licensed health care professional [PLHCP] means 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 by 29 CFR 1926.1153(h).

Respirable crystalline silica means quartz, cristobalite, and/or tridymite contained in airborne particles that are determined to be respirable by a sampling device designed to meet the characteristics for respirable-particle-size-selective samplers specified in the International Organization for Standardization (ISO) 7708:1995: Air Quality—Particle Size Fraction Definitions for Health-Related Sampling.

Specialist means an American Board-Certified Specialist in Pulmonary Disease or an American Board-Certified Specialist in Occupational Medicine.

Where Employee Exposure Will Remain Below 25 µg/m³ as an 8-Hour TWA

The standard does not apply where employee exposure will remain below 25 µg/m³ as an 8-hour TWA under any foreseeable conditions. The phrase "any foreseeable conditions" refers to situations that can reasonably be anticipated. OSHA considers failure of engineering controls to be a situation that is reasonably foreseeable. Although engineering controls are usually a reliable means for controlling employee exposures, equipment does occasionally fail. Thus, the standard applies where exposures below 25 µg/m³ as an 8-hour TWA are expected or achieved, but only because engineering controls are being used to limit exposures.

Employee exposure can reasonably be anticipated to remain below 25 µg/m³ as an 8-hour TWA when performing certain tasks that involve only minimal exposure to respirable crystalline silica. Such tasks include:

- Mixing concrete for post holes;
- Pouring concrete footers, slab foundation, and foundation walls; and
- Removing concrete formwork.

When these tasks are performed in isolation from tasks that generate significant exposures to respirable crystalline silica, the standard does not apply. These examples are not exclusive, and there may be other tasks that involve exposure under 25 µg/m³ as an 8-hour TWA under any foreseeable conditions.

Some employees in the construction sector perform tasks involving occasional, brief exposures to respirable crystalline silica that are incidental to their primary work. These workers include carpenters, plumbers, and electricians who occasionally drill holes in concrete or masonry or perform other tasks that involve exposure to respirable crystalline silica. Where employees perform tasks that involve exposure to respirable crystalline silica for a very short period of time, exposures for many tasks will be below 25 µg/m³ as an 8-hour TWA.

For example, for hole drillers using handheld drills, if the duration of exposure is 15 minutes or less, the 8-hour TWA exposure can reasonably be anticipated to remain under the 25 µg/m³ threshold (assuming no exposure for the remainder of the shift), and the standard would not apply.

OSHA Compliance Options – Silica Rule

If it's determined that work is covered by the standard, an employer has two options for limiting employee exposure to respirable crystalline silica:

1. **Specified exposure control methods; or**
2. **Alternative exposure control methods.**

Option 1 – Specified Exposure Control Methods (Table 1)

Employers who choose the specified exposure controls option must fully and properly implement protections for the tasks or equipment listed in **Table 1** of the silica standard (29 CFR 1926.1153).

Employers who fully and properly implement the controls in **Table 1** do not have to assess employees' silica exposure levels or keep employee exposures at or below the permissible exposure limit (PEL).

Option 2 – Alternative Exposure Control Methods (PEL)

Employers who follow alternative exposure control methods must:

- Determine the levels of respirable crystalline silica that employees are exposed to;
- Limit employee exposures to a PEL of 50 micrograms per cubic meter of air (50 µg/m³) as an 8-hour time-weighted average (TWA);
- Use engineering and work practice controls, to the extent feasible, to limit employee exposures to the PEL, and supplement the controls with respiratory protection when necessary.
- Keep records of employee exposure to respirable crystalline silica.

All employers covered by the standard must:

- ✓ Provide respiratory protection when required;
- ✓ Restrict housekeeping practices that expose employees to respirable crystalline silica where feasible alternatives are available;
- ✓ Establish and implement a written exposure control plan, including designating a competent person;
- ✓ Offer medical exams to employees who will be required to wear a respirator under the standard for 30 or more days a year; and
- ✓ Communicate hazards, train employees and keep records of medical examinations.

Roadmap for Meeting the Requirements of the Silica Standard

1. Determine if the silica standard applies to your employees.

Could employees be exposed to respirable crystalline silica at or above 25 µg/m³ as an 8-hour TWA under any foreseeable conditions, including the failure of engineering controls, while performing construction activities?

No: No further action is required under the silica standard.

Yes: Choose to comply with the standard using either the:

- Specified exposure control methods as stated in **Table 1** of OSHA silica standard §1926.1153, or
- The alternative methods of compliance.

2. Determine what additional requirements you must meet under the standard, based on the compliance method you are following:

Requirement	Must the Employer Follow this Requirement?	
	If Fully and Properly Implementing Table 1	**If Following Alternative Exposure Controls**
PEL	**No**	**Yes**
Exposure Assessment	**No**	**Yes,** when exposures are reasonable expected to be above the action level.
Methods of Compliance	**No**	**Yes**
Respiratory Protection	**Yes,** if respirator use is required by Table 1	**Yes,** if respirator use is required to reduce exposures to the PEL
Housekeeping	**Yes**	**Yes**
Written Exposure Control Plan	**Yes**	**Yes**
Medical surveillance	**Yes,** for employees who must wear a respirator under the silica standard for 30 or more days a year.	
Communication of Hazards	**Yes**	**Yes**
Recordkeeping	**Yes,** for any employees who are getting medical examinations	**Yes,** for exposure assessments and for any employees who are getting medical examinations

Description of Table 1 Entries

List of common tasks using various types of tools or equipment found at construction sites:

(i) Stationary masonry saws;

(ii) Handheld power saws (any blade diameter);

(iii) Handheld power saws for cutting fiber-cement board (with blade diameter of 8 inches or less)

(iv) Walk-behind saws;

(v) Drivable saws;

(vi) Rig-mounted core saws or drills;

(vii) Handheld and stand-mounted drills (including impact and rotary hammer drills);

(viii) Dowel drilling rigs for concrete;

(ix) Vehicle-mounted drilling rigs for rock and concrete;

(x) Jackhammers and handheld powered chipping tools;

(xi) Handheld grinders for mortar removal (i.e., tuckpointing);

(xii) Handheld grinders for uses other than mortar removal;

(xiii) Walk-behind milling machines and floor grinders;

(xiv) Small drivable milling machines (less than half-lane);

(xv) Large drivable milling machines (half-lane and larger);

(xvi) Crushing machines;

(xvii) Heavy equipment and utility vehicles when used to abrade or fracture silica-containing materials (such as hoe-ramming or rock ripping) or during demolition activities involving silica-containing materials; and

(xviii) Heavy equipment and utility vehicles for tasks such as grading and excavating but not including demolishing, abrading, or fracturing silica-containing materials.

NOTE: Exposures to respirable crystalline silica also occur during tunneling operations and during abrasive blasting when sand or other blasting agents containing crystalline silica are used, or when abrasive blasting is performed on substrates that contain crystalline silica, such as concrete.

What Employees are covered under Table 1?

Employees engaged in the Table 1 task include:

- Equipment operator;
- Helpers;
- Laborers; and
- Other employees who are assisting or responsible for completing the task.

For example…

- An employee operating a walk-behind saw and another employee helping the operator guide the saw are both engaged in the task.
- An employee operating a jackhammer would be engaged in the task, but another employee directing traffic near the employee jackhammering would not be engaged in the task.

When Table 1 requires respiratory protection or additional protection, employers must provide that level of protection to all employees engaged in the task. Employers must describe procedures for restricting access of employees not engaged in the task as part of its *Written Exposure Control Plan*.

Table 1 – Entry (xvii) heavy equipment used during demolition activities.

When heavy equipment is used during demolition activities involving silica-containing materials, the equipment must be operated from within an enclosed cab. When employees outside of the cab are engaged in the task, then water and/or dust suppressants must be applied to minimize dust emissions.

(Picture) Two workers helping with the demolition of silica-containing material.

Table 1 requires that water and/or dust suppressants be applied. If no dust suppressants are used, then the two helpers need to be evaluated for silica exposure (Alternative Method of Compliance). The operator inside an enclosed cab is protected under Table 1.

What does it mean to be "Fully and Properly Implemented"?

Fully and properly implemented means that controls are in place, are properly operated and maintained, and employees understand how to use them. OSHA requires that controls are fully and properly implemented.

Refer to equipment operators manuals for information on proper use of dust controls.

The presence of large amounts of visible dust generally indicates that controls are not fully and properly implemented. *Large amounts of visible dust means controls are not fully and properly implemented.*

A small amount of dust can be expected from equipment that is operating as intended by the manufacturer; however, a noticeable increase in dust generation during the task is a sign that the dust controls are not operating correctly. The difference between the small amounts of dust generated when control measures are working properly and the large amount of dust generated during tasks when control measures are not used or not operated effectively is easily observed. When this happens, prompt corrective actions are required.

Water Delivery Systems

- ✓ Integrated water systems must be developed specifically for the type of tool in use so they will apply water at the appropriate dust emission points based on tool configuration and do not interfere with other tool components or safety devices. Water systems designed for blade cooling also suppress dust and meet the requirements for Table 1.

Integrated Water Delivery System

- ✓ The water must be applied at flow rates sufficient to minimize release of visible dust. Effective control of the dust depends on factors such as dust particle size, dust particle velocity, spray nozzle size and location, use of surfactants or other binders, and environmental factors (water hardness, humidity, weather, etc.), all of which must be considered when using wet methods.

Water flow rates must be sufficient to minimize visible dust.

- ✓ The appropriate water flow rates for controlling silica dust emissions can vary; therefore, it is necessary to follow manufacturers' instructions when determining the required flow rate for dust suppression systems on a given worksite.

Water flow rates must be sufficient to minimize visible dust.

Image Source: elcosh images/NIOSH/John Rekus

Water Delivery Systems

- ✓ Any slurry generated when using water to suppress dust should be cleaned up to limit secondary exposure to silica dust. If the slurry dries, then follow procedures described in the employer's *Written Exposure Control Plan*. No dry sweeping allowed!
- ✓ *Clean up slurry to limit secondary exposure to silica dust.*

- ✓ WorkWhen working in cold temperatures, where there is a risk of water freezing, additional work practices such as insulating drums, wrapping drums with gutter heat tape or adding environmentally-friendly antifreeze additives to water may be needed.
- ✓ *Water delivery systems require additional work practices in cold weather.*

- × Water delivery systems that are not integrated from the manufacturer are <u>not</u> allowed!
- × *Water delivery systems that are not integrated from the manufacturer are <u>not</u> allowed!*

Dust Collection Systems

Commercially available dust collection systems are required for several types of equipment in Table 1. This requirement ensures that employers use equipment that is designed to effectively capture dust generated by the tool being used and does not introduce new hazards such as obstructing or interfering with safety mechanisms. The "commercially available" limitation is meant only to eliminate on-site improvisations of equipment by the employer.

Aftermarket Manufacturers

Employers can use products that are made by aftermarket manufacturers (someone other than the original tool manufacturer) that are intended to fit the make and model of the tool. This includes custom-designed products made to meet the particular needs and specifications of the employer purchasing the product. These systems are designed to work effectively with the equipment and not introduce new hazards such as obstructing or interfering with safety mechanisms. ***DustBull Universal Dust Shroud for Cut Off Saws, by Dustless Technologies***

Filter Cleaning Mechanism

Some Table 1 entries for dust collection systems specify use of cyclonic pre-separators and filter cleaning mechanisms to prevent buildup of debris on filters that result in less dust capture. A cyclonic pre-separator collects large debris before the air reaches the filters. A filter cleaning mechanism prevents the need for manually cleaning filters to prevent buildup of debris (caking). Some vacuums are equipped with a gauge indicating filter pressure or an equivalent device (*e.g.*, timer to periodically pulse the filter) to help employees in determining when it is time to run a filter cleaning cycle.

A self-cleaning system makes a "thumping" sound which is caused when a solenoid closes a butterfly valve and reverses the air flow thru the filter. This action blows the fine dust off the filter keeping it clean and then reopens the vale. ***DEWALT HEPA Vacuum DWV012***

Indoors or Enclosed Areas

Several Table 1 entries refer to tasks performed "outdoors" or "indoors or in an enclosed area." Indoors or in an enclosed areas mean areas where airborne dust can build up unless additional exhaust is used. For example, a work area with only a roof that does not affect the dispersal of dust would not be considered enclosed; however, an open-top structure with three walls and limited air movement or a roof that does limit dispersal would be considered enclosed.

Means of Exhaust

Sufficient air circulation in enclosed or indoor environments is important to ensure the effectiveness of the control strategies and to prevent the accumulation of airborne dust. Employers following Table 1 are required to provide a means of exhaust as needed to minimize the accumulation of visible airborne dust for tasks performed indoors or in enclosed areas.

The means of exhaust necessary could include:

- Portable fans (box fans, floor fans, axial fans);
- Portable ventilation systems; or
- Other systems that increase air movement and assist in the removal and dispersion of airborne dust.

To be effective, the ventilation must be set up so that movements of employees during work, or the opening of doors and windows, will not negatively affect the airflow.

Work performed indoors or in enclosed spaces requires a means of exhaust, such as a portable fan, to minimize the accumulation of visible airborne dust.

Enclosed Cabs

Enclosed cabs or booths are specified for rock drilling, crushers, and heavy equipment.

Employers must 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 work properly;
- ✓ Is under positive pressure maintained through continuous delivery of filtered air;
- ✓ Has intake air that is filtered through a pre-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.

The controls for enclosed cabs lower the potential for dust to be re-suspended inside the cab or enter the enclosed cab or booth. They also ensure that the filtered air provided to the employee does not contain silica particles and that the working conditions in the cab are comfortable so that employees are less likely to open windows and be exposed. ***Equipment operator in enclosed cab with positive pressure.***

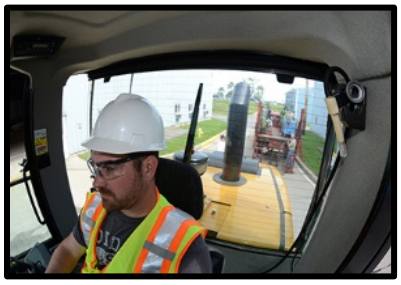


Image Source: CDC/NIOSH

The procedures for maintaining and cleaning the cab or booth, and for frequent and regular inspections of the cabs and booths, must be addressed through the employer's *Written Exposure Control Plan* and *Competent Person* requirements. ***Refer to equipment manufacturers procedures for cab inspection details.***

Determining Task Duration and Requirements for Respirator Use

Respirator requirements in Table 1 are divided by task duration:

- "Less than or equal to four hours/shift" and,
- "Greater than four hours/shift".

Table 1

Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
≤ 4 hours/shift	> 4 hours/shift

Each of the following scenarios is considered a "shift" for purposes of determining the maximum amount of time that an employee may spend on Table 1 tasks without respiratory protection:

- A standard 8-hour work period;
- A day with a break between work periods (*e.g.*, four hours on, two hours off, four hours on);
- Work periods longer than eight hours;
- Double shifts within a single day;
- A work period spanning two calendar days (*e.g.*, 8 p.m. until 4 a.m.).

Task duration time starts when the operator begins using the tool, and continues to be counted until he or she completes the task. This time includes intermittent breaks in tool usage and clean-up. However, tasks that are performed multiple times per day, during distinct time periods, should be counted as separate tasks, and times should be combined.

The requirement to provide respirators is based on the anticipated duration of the task. Employers must make a good-faith judgment of the task's anticipated duration over the work shift, whether performed continuously or intermittently, based on previous experience and all other available information.

Alternative Exposure Control Methods

Employers that conduct tasks not listed in Table 1 or do not fully and properly implement the engineering controls, work practices, and respiratory protection described in Table 1 of the specified exposure control methods approach must follow the alternative exposure control methods approach. The alternative exposure control methods approach involves assessing employee exposure to respirable crystalline silica, and limiting exposure to the PEL using feasible engineering and work practice control methods, and respiratory protection when necessary.

There are three components of the alternative exposure control method:

1. **The PEL;**
2. **Exposure assessment; and**
3. **Methods of compliance.**

Permissible Exposure Limit (PEL)

Employers complying with the alternative exposure control methods must ensure that their employees' exposures to respirable crystalline silica do not exceed the PEL, which is 50 µg/m³ as an 8-hour TWA. This means that over the course of any 8-hour work shift, exposures can fluctuate, but the average exposure to respirable crystalline silica cannot exceed 50 µg/m³.

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1 gram (g) = 1,000 milligrams (mg) = 1,000,000 micrograms (µg)

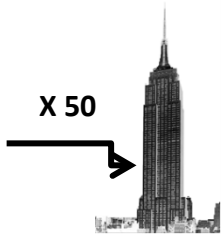
50 sugar packets in the volume of the Empire State Building is equivalent to 50 µg/m³.

What is 50 µg/m³?

One (1) packet of sugar or artificial sweetener may contain 1 gram (g) of product. Divide this packet of sugar by one million (1,000,000) times and you will have 1 microgram (µg). Fifty (50) micrograms in the space of one (1) cubic meter is the PEL for silica (50 µg/m³).

Or

50 µg/m³ is the equivalent to 50 grams (g) of dust into the space of one million cubic meters. The Empire State Building in New York City is approximately 1,000,000 cubic meters. Fifty packets of sugar in the space of the Empire State Building is equivalent to 50 µg/m³.



Exposure Assessment

Construction employers following alternative exposure control methods must assess the 8-hour TWA exposure for each employee who is or may reasonably be expected to be exposed to respirable crystalline silica at or above the action level of 25 µg/m³ as an 8-hour TWA.

The purposes of assessing employee exposures include:

- Identifying where exposures are occurring;
- Helping the employer select control methods and make sure those methods are effective;
- Preventing employees from being exposed above the PEL;
- Providing employees with information about their exposure levels; and
- Allowing the employer to give the physician or other licensed health care professional [PLHCP] performing medical examinations information about employee exposures.

There are two options for assessing exposure:

1. **Performance Option**
   - Objective data
   - Combination air monitoring and objective date thereof to accurately characterize respirable crystalline silica worker exposure.
2. **Scheduled Air Monitoring**

(Picture) Worker wearing silica sampling equipment, to include air pump, hose and cassette assembly.

The correct placement for air sampling cassettes is near the breathing zone of the employee. It should be as close as possible to the nose and mouth of the employee, i.e., in a hemisphere forward of the shoulders with a radius of 6 to 9 inches.

Performance Option

The performance option gives employers flexibility to determine the 8-hour TWA exposure for each employee based on any combination of air monitoring data or objective data that can accurately characterize employee exposures to respirable crystalline silica.

- Air monitoring data are any results of air monitoring that the employer has done to meet the requirements of the standard.
- Objective data is information that demonstrates employee exposure to respirable crystalline silica associated with a particular product or material or a specific process, task, or activity.

Examples of objective data are information such as:

- Air monitoring data from industry-wide surveys;
- Calculations based on the composition of a substance;
- Area sampling results and exposure mapping profile approaches; and
- Historical air monitoring data collected by the employer.

Employers choosing the performance option must:

- Conduct the exposure assessment before work begins;
- Reassess exposures whenever a change in production, process, control equipment, personnel, or work practices may reasonably be expected to result in new or higher 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;
- Make sure that the exposure assessment reflects the exposures of employees on each shift, for each job classification, in each work area (i.e., types of material, control methods, work practices, and environmental conditions).

Benefits of the Performance Option:

- Useful when measuring employee exposures is challenging, such as when tasks are conducted for short durations of time or performed under different weather conditions.
- Gives employers flexibility for characterizing the exposures of all employees. For example, monitoring one employee doing a job and applying that data to other employees performing the same job.
- Allows employers to characterize employee exposure within a range so as to determine what kind of respirator needs to be worn and if medical surveillance is needed.

Scheduled Monitoring Option

The scheduled monitoring option lets employers know when and how often they must perform exposure monitoring to measure employee exposures. When following the scheduled monitoring option, employers must make sure that:

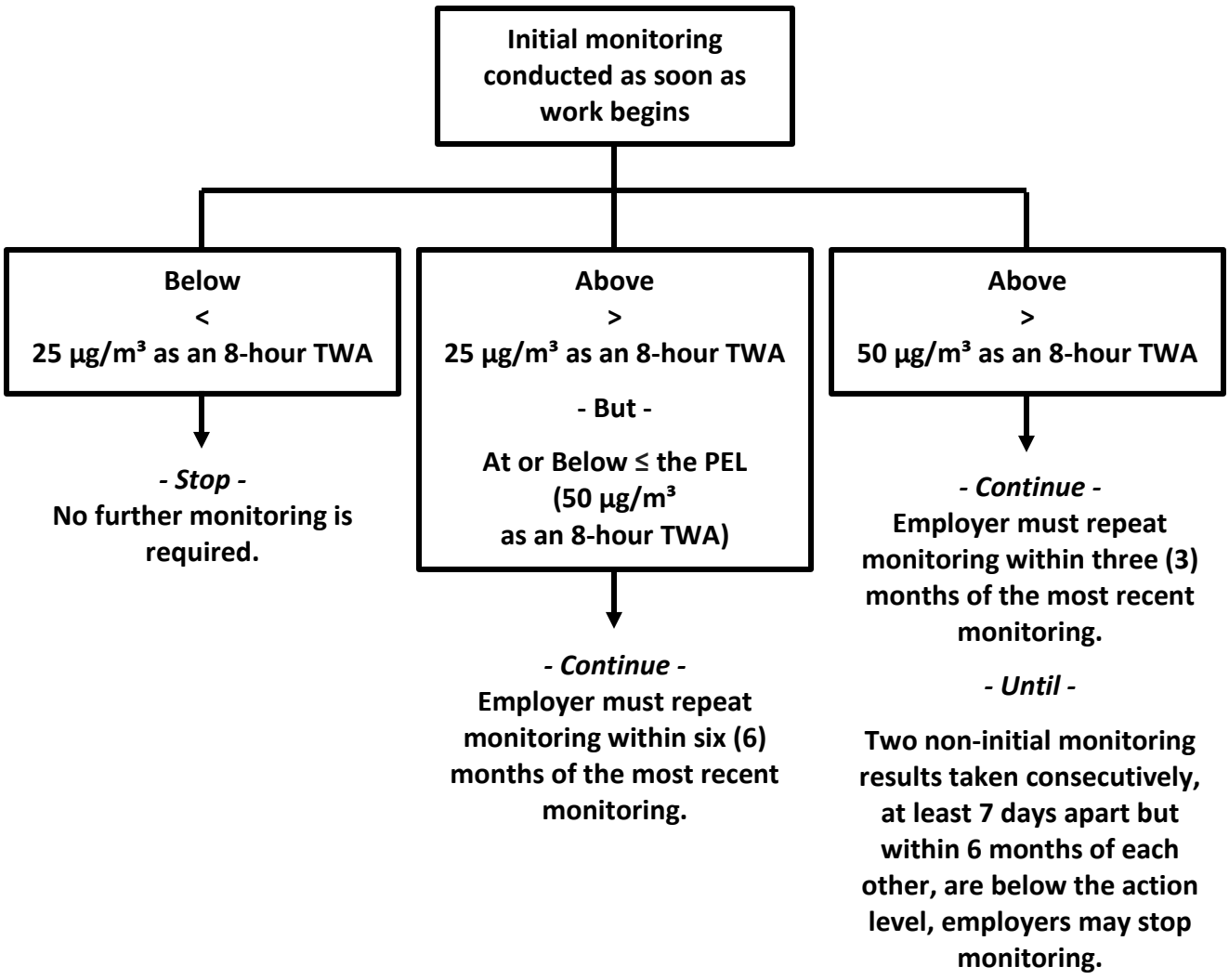
- Results represent the employee's TWA exposure to respirable crystalline silica over an eight-hour workday;
- Samples are collected from the employee's breathing zone; and
- Samples are collected outside respirators so that they represent the exposure that would occur without the use of the respirator.

OSHA intends for employers using the scheduled monitoring option to conduct initial monitoring as soon as work begins.

Employers choosing the scheduled monitoring option must:

- Correctly characterize each employee's exposure to respirable crystalline silica;
- Include, at a minimum, one full-shift sample taken for each job function in each job classification, in each work area, and on each shift; and
- Include the employee expected to have the highest exposure to respirable crystalline silica (for example, the employee closest to an exposure source).

NOTE: Representative monitoring is allowed when several employees perform the same job on the same shift and under the same conditions.



Scheduled Monitoring Option Flow Chart

Reassessment of Exposures

The employer must reassess exposures whenever a change in production, process, control equipment, personnel, or work practices may reasonably be expected to result in new or additional exposures to respirable crystalline silica at or above the action level.

Methods of Sample Analysis (Appendix A of the Standard)

Employers must make sure that all air samples taken to meet the requirements of the silica standard are analyzed by a laboratory that follows the procedures in Appendix A. If employers hire an outside laboratory to do the analyses for respirable crystalline silica, they can rely on a statement from that laboratory that it follows Appendix A of OSHA's respirable crystalline silica standard.

Employee Notification

Employers must notify each affected employee of the results of the exposure assessment within 5 working days of completing it.

"Affected" means all employees whose exposures were assessed, including employees whose exposures were represented by other employees' exposure measurements, and those whose exposure assessments were based on objective data.

The 5-day period for notification starts when:

- An employer following the performance option finishes the exposure assessment; or
- An employer following the scheduled monitoring approach receives the laboratory results.

Additional notification requirements:

- Employers must either notify each employee in writing or post the results in a location that all affected employees can access. In cases where an employee might have moved onto another job or jobsite, the assessment results could be included with the employees' final paycheck.
- Exposures can be characterized and reported as a range (for example, between the action level and the PEL), but must reflect exposures that would occur if the employee were not using a respirator.
- When an exposure assessment reveals exposures above the PEL, the written notification must also describe the corrective action the employer is taking to reduce employee exposures to or below the PEL. Corrective actions include engineering controls. However, if engineering controls are not feasible or the employer needs more than 5 days to identify the right engineering controls, respiratory protection is the corrective action that would be described in the written notification.

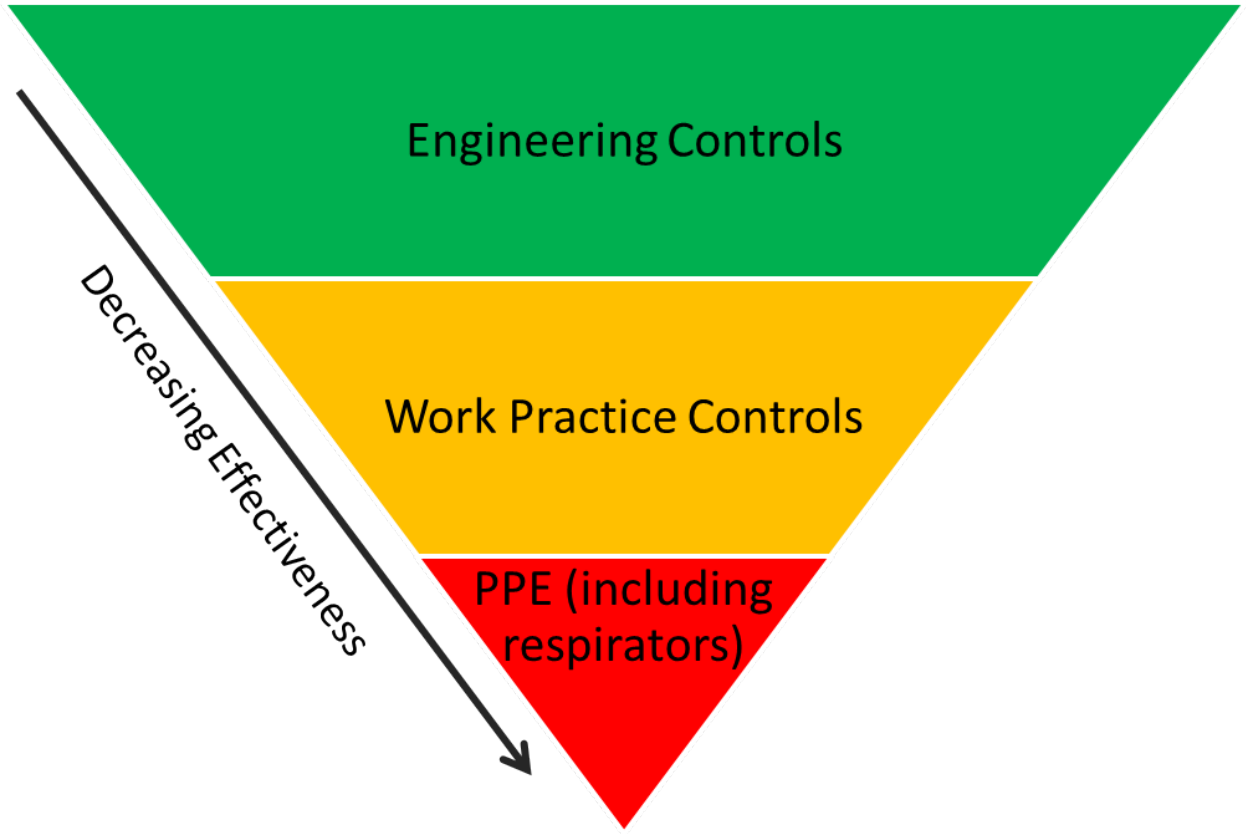
Observation of Monitoring

The employer must let affected employees or their designated representatives observe any air monitoring of employee exposure to respirable crystalline silica. When observation of monitoring requires entry into an area where use of protective clothing or equipment, such as a respirator, is required, the employer must provide the observer with that protective clothing or equipment. The employer must provide the protective clothing and equipment at no cost, and make sure that the observer uses such clothing or equipment.

Methods of Compliance

Employers following alternative exposure control methods must comply with the methods of compliance requirements of the standard. The methods of compliance section of the standard requires employers to protect employees following the hierarchy of controls, which relies on engineering and work practice controls for reducing exposures and allows for respirator use, in addition to those controls, only when feasible engineering controls cannot reduce exposures to acceptable levels.

Hierarchy of Controls



Reducing exposures through the primary use of engineering and work practice controls is known as the hierarchy of controls, and it is a long-standing OSHA policy.

Engineering and Work Practice Controls

Employers must use engineering and work practice controls to reduce and keep employee exposure to respirable crystalline silica to or below the PEL of 50 μg/m³, unless the employer can demonstrate that such controls are not feasible. If feasible engineering and work practice controls are not able to reduce employee exposures to or below the PEL, employers must still use feasible controls to reduce exposures to the lowest possible level and then use respiratory protection along with those controls.

Examples of Engineering Controls

The main types of engineering controls for silica are:

- **Wet methods** (applying water or foam at the point of dust generation to keep dust from getting into the air);
- **Local exhaust ventilation** (removed dust by capturing it at or near the point where it is created); and
- **Isolation** (separates employees from the dust source by containing the dust or isolating employees).

Table 1 – Entry (xii) handheld grinders for use other than mortar removal.

Using a handheld grinder for purposes other than mortar removal, the tool must be equipped with either an integrated water delivery system or with a commercially available shroud and dust collection system.

(Picture) Worker using a handheld grinder for uses other than mortar removal inside a stairwell may not be able to use a wet method due to excessive water discharge. Dust collection system is used instead.

Table 1 requires that when using a handheld grinder for uses other than mortar removal, used indoors, more than 4 hours, additional respiratory protection is required.

Engineering Controls Examples

Images Source: CPWR Silica Safe

✘No Engineering Controls

✓Yes Engineering Controls

Images Source: CPWR Silica Safe

✘No Engineering Controls

✓Yes Engineering Controls

Advantages of engineering controls are that they:

- Control crystalline silica-containing dust particles at the source, thus minimizing exposures to all persons in the surrounding work area;
- Are reliable, predictable, and provide consistent levels of protection to a large number of employees;
- Can be monitored; and
- Are less prone to human error than the use of personal protective equipment.

Work Practice Controls

Work practice controls involve performing a task in a way that reduces the likelihood or levels of exposure. Work practice controls are often used with engineering controls to protect employees. Employees must know the appropriate work practices for maximizing the effectiveness of controls and minimizing exposures.

Examples of work practice controls include:

- Inspecting and maintaining controls to prevent or fix malfunctions that would result in increased exposures;
- Making sure that nozzles spray water at the point of dust generation for wet method controls;
- Making sure that hoses are not kinked on a tool used with a dust collector;
- Making sure that drill bit is installed correctly;
- Wetting down silica dust before sweeping it up; and
- Scheduling work so that tasks that involve high exposures are performed when no other employees are in the area.

Good work practice controls. Wetting down silica dust before sweeping limits exposure.

Poor work practice controls. No dry sweeping allowed.

Proper Fitting of Drill Bit

To operate a handheld drill in accordance with manufacturer's instructions and to allow proper suction, position the nozzle assembly so the bit is flush with the forward face of the nozzle.

✘ **Incorrect**

✓**Correct**

✘ **Incorrect**

Personal Protective Equipment

Under the hierarchy of controls, respirators can be another effective way to protect employees. However, respirators may be less practical or effective than engineering controls for the following reasons:

- They must be selected for each worker, fitted, occasionally refitted, and regularly maintained (including replacing filters and other parts as necessary).
- Employees have to consistently and correctly use properly fitted respirators but may resist wearing them because respirators can be uncomfortable, especially in hot weather.
- Respirators may put a physical strain on employees' bodies, as a result of the respirator's weight and because they increase breathing resistance. Employees with some health conditions cannot wear respirators because the physical strain of wearing the respirator increases their risk of illness, injury, and even death.
- Respirators can create safety concerns because they interfere with workers' ability to hear, see, smell, and communicate.
- Respirators only protect the employees wearing them.

Even when engineering and work practice controls cannot reduce exposure levels to or below the PEL, those controls must be used to reduce exposures as low as possible. This reduction in exposure levels benefits employees by reducing the required protection factor of the respirator, and thus increasing the choices of respirators that can be used.

For example, if feasible engineering controls reduce exposures from 50 times to less than 10 times the PEL, employers could provide approved half-mask respirators with an assigned protection factor (APF) of 10 that may be lighter and easier to use compared to full-facepiece respirators.

Half-mask Respirator

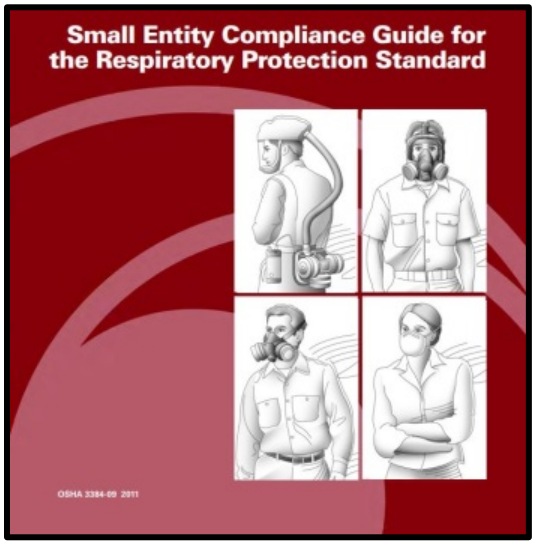
Discussion Points

- **OSHA-permissible use of respirators.**
- **Procedures for selecting respirators.**
- **Medical evaluations of employees required to use respirators under the silica standard.**
- **Fit-testing procedures for tight-fitting respirators.**
- **Procedures and schedules for cleaning, disinfecting, storing, inspecting, repairing, discarding, and maintaining respirators.**
- **Voluntary use of respirators.**

Respirator Permissible Practice

To control occupational hazards caused by breathing air contaminated with harmful dusts, fogs, fumes, mists, gases, smokes, sprays, or vapors, the primary objective shall be to prevent atmospheric contamination. This can be accomplished by accepted engineering control measures (for example, enclosure or confinement of the operation, general and local ventilation, and substitution of less toxic materials). If effective engineering controls are not possible, or while they are being instituted, then respirators must be used to control exposure.

OSHA's ***Small Entity Compliance Guide for the Respiratory Protection Standard*** provides a step-by-step guide, complete with checklists and commonly asked questions, which will provide employees and employers with a better understanding of OSHA's respiratory protection standard.



OSHA Publication 3384-09 2011

Respirator Selection

The selection of respirator use in the workplace shall be determined by the employer's *Program Administrator*. OSHA requires that an employer designate a Program Administrator to oversee employee respiratory protection and ensure compliance with the OSHA regulations.

Common Air Purifying Respirators used to Control Silica Exposure

Filtering Facepiece (dust mask) – a negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece comprised of the filtering medium. APF 10

Half Mask Elastomeric (tight-fitting facepiece) – a respirator that covers the nose and fits under the chin to create a complete seal with the face. APF 10

Full Facepiece Elastomeric (tight-fitting) Respirator – a respirator that fits around the entire face and forms a complete seal with the face. APF 50

Tight-Fitting Full Facepiece Powered Air-Purifying Respirator (PAPR) – a full facepiece, tight-fitting respirator that has a powered fan that blows air into the mask creating a positive pressure within the seal of the respirator. APF 1,000

NIOSH Filtering Facepiece Respirator (FFR) Labels

Individual filtering facepiece respirators (disposable) are required to have the following markings:

1. Name of approval holder (usually the manufacturer), a registered trademark, or an easily understood abbreviation of the approval holder's business name as recognized by NIOSH. When applicable, the name of the entity to which the FFR has been private-labeled by the approval holder may replace the approval holder business name, registered trademark, or abbreviation of the approval holder business name as recognized by NIOSH.
2. NIOSH in block letters or the NIOSH logo.
3. NIOSH Testing and Certification approval number, e.g., TC-84A-XXXX.
4. NIOSH filter series and filter efficiency level, e.g., N95, N99, N100, R95, P95, P99, P100.
5. Model number or part number: The approval holder's respirator model number or part number, represented by a series of numbers or alphanumeric markings, e.g., 8577 or 8577A.

Sample of a generic filtering facepiece respirator with appropriate markings.

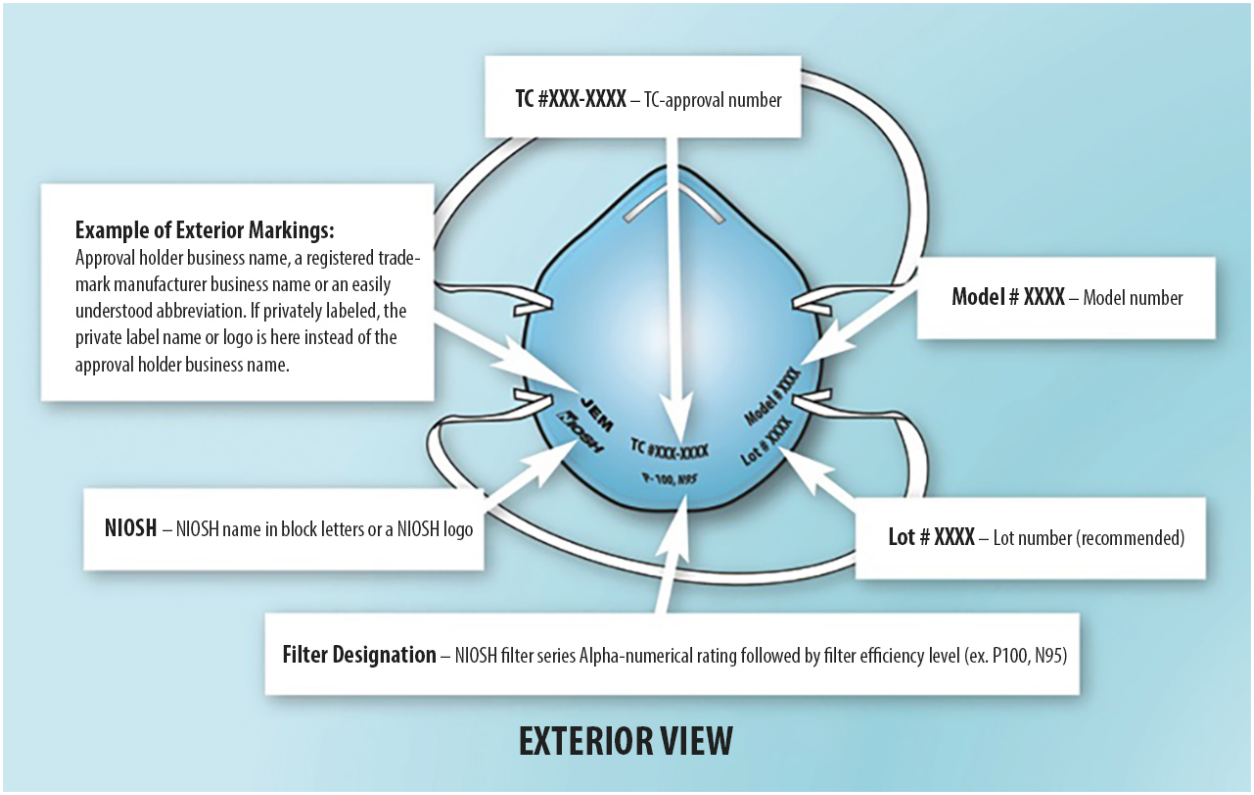


Image Source: www.cdc.gov/niosh

Table 1. (29 CFR 1910.134) -- Assigned Protection Factors[5]

Assigned protection factor (APF) refers to 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.

Type of respirator[1, 2]	Quarter mask	Half mask	Full facepiece	Helmet/ hood	Loose-fitting facepiece
Air-Purifying Respirator	5	[3]10	50	.....	.....
Powered Air-Purifying Respirator (PAPR)	.....	50	1,000	[4]25/1,000	25
Supplied-Air Respirator (SAR) or Airline Respirator					
• Demand mode	.....	10	50	.....	.....
• Continuous flow mode	.....	50	1,000	[4]25/1,000	25
• Pressure-demand or other positive-pressure mode	.....	50	1,000	.....	.....
Self-Contained Breathing Apparatus (SCBA)					
• Demand mode	.....	10	50	50	.....
• Pressure-demand or other positive-pressure mode (e.g., open/closed circuit)	.....	.....	10,000	10,000	.....

NOTES:

1 Employers may select respirators assigned for use in higher workplace concentrations of a hazardous substance for use at lower concentrations of that substance, or when required respirator use is independent of concentration.

2 The assigned protection factors in Table 1 are only effective when the employer implements a continuing, effective respirator program as required by this section (29 CFR 1910.134), including training, fit testing, maintenance, and use requirements.

3 This APF category includes filtering facepieces, and half masks with elastomeric facepieces.

4 The employer must have evidence provided by the respirator manufacturer that testing of these respirators demonstrates performance at a level of protection of 1,000 or greater to receive an APF of 1,000. This level of performance can best be demonstrated by performing a WPF or SWPF study or equivalent testing. Absent such testing, all other PAPRs and SARs with helmets/hoods are to be treated as loose-fitting facepiece respirators, and receive an APF of 25.

5 These APFs do not apply to respirators used solely for escape. For escape respirators used in association with specific substances covered by 29 CFR 1910 subpart Z, employers must refer to the appropriate substance-specific standards in that subpart. Escape respirators for other IDLH atmospheres are specified by 29 CFR 1910.134 (d)(2)(ii).

Medical Evaluations for Respirators and Silica

After determining which respirator is required, the employer's Program Administrator must ensure that employees are physically capable of wearing respirators. A medical evaluation may be performed in one of two ways. First, a confidential questionnaire (Appendix C of the Respirator Standard, 29 CFR 1910.134) may be given during work hours, or at a time and location convenient for the employee, in a language that the employee can read. OSHA provides a translated questionnaire in Spanish. The employee may provide a translator to read the questions to the employee. The employer may not provide a translator or be present during the questioning. After completing the questionnaire, the employee puts it into an envelope and seals it. The employer is required to send the sealed envelope to its designated Physician or Licensed Health Care Professional (PLHCP).

Another option for employee medical evaluation is a face-to-face interview with the PLHCP asking the same questions as those found on the questionnaire. The employer must provide a copy of its written respirator program to the PLHCP and the medical evaluation section of the Respirator Standard (29 CFR 1910.134).

After evaluating the employee, the PLHCP shall reply to the employer and state:

1. If the employee can wear a respirator;
2. Any limitations on respirator use for the employee;
3. The need and frequency for follow-up evaluations; and
4. That the PLHCP has communicated the same information to the employee.

This information comprises the Medical Record, which must be kept for the employee's duration of employment plus thirty (30) years thereafter, but the questionnaire is not shared with the employer.

Note to Employers:

Employees must be allowed to answer the required questionnaire during normal working hours or at a time and place that is convenient. To maintain employee confidentiality, the employer's review of the completed questionnaire is not permitted and the employee must be instructed how to deliver or send the questionnaire to the health care professional who will review it.

Medical Evaluations under the Silica Standard

Employers must make an initial or periodic medical examination available to employees who will be required by the silica standard to wear a respirator for 30 or more days during the next 365 days. If the employee is required to wear a respirator at any time during a day, then that period of time is considered one day of respirator use.

An employer is allowed to estimate how often respirator use will be required by the standard during the upcoming year based upon the types of tasks that the employee will perform, as well as how long and how often those tasks are performed. Respirator use by the employee for a previous employer shall not be considered.

If unexpected circumstances result in an employee being required to wear a respirator more frequently than anticipated, then the employer must make medical surveillance available as soon as it becomes apparent that the employee will be required by the silica standard to wear a respirator for 30 or more days during the next 365 days.

Frequency of Medical Exams

Employers must offer medical examinations:

- Within 30 days of initial assignment (i.e., the date when the employee starts working in a job/ task in which he or she will be required by the silica standard to wear a respirator for 30 or more days per year), unless the employee has had an examination that meets the requirements of the silica standard within the past three years.
- Every three years from the employee's last examination that met the requirements of the silica standard, or more frequently if recommended by the PLHCP, if the employee will continue to perform tasks that require respirator use under the silica standard for 30 or more days per year.

A PLHCP might recommend more frequent medical examinations based upon factors such as high exposure levels or a medical finding, such as an x-ray, suggesting silicosis. Employers must ensure that employees receive a dated copy of the PLHCP's written medical opinion so that the employee may present that opinion to a new employer as proof of a current medical examination.

Employers must provide a copy of medical evaluation results to employees within 30 days of completion of the evaluation.

Required Medical Tests for Silica

An initial medical examination provided under the silica standard must consist of:

- An assessment of medical and work history that focuses 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 (for example, shortness of breath, cough, wheezing); history of tuberculosis; and cigarette smoking status and history.
- A physical examination of the respiratory system.
- A digital or film chest x-ray interpreted according to the International Labour Office (ILO) International Classification of Radiographs of Pneumoconioses by a National Institute for Occupational Safety and Health (NIOSH)-certified B Reader (this involves a certified physician reading the x-ray according to certain procedures to determine if it shows signs of diseases, such as silicosis).
- A lung function (spirometry) test that includes forced vital capacity (the total amount of air that is forcefully blown out after taking a full breath), forced expiratory volume in one second (the amount of air forcefully blown out in the first second), and FEV1/FVC ratio (the speed of air that is forcefully blown out), 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 (medically necessary and/or related to respirable crystalline silica exposure) by the PLHCP.

Sample Medical Forms for Silica

Appendix B of OSHA's Respirable Crystalline Silica standard for construction contains sample forms that are to be provided to the employer and employee. Three sample forms are included here. The first is a sample written medical report for the employee. The second is a sample written medical opinion for the employer. The third is a sample written authorization form that employees may sign.

- **Sample Form 1** is a sample of the written medical report that the PLHCP provides to the employee. The employer does not receive a copy of the written medical report.
- **Sample Form 2** is a sample of the written medical opinion that the PLHCP provides to the employer. The PLHCP uses this form to specify the type of examination and recommendations on use of a respirator.
- **Sample Form 3**, if signed by the employee, allows the PLHCP to release further information to the employer. The PLHCP must include any recommended limitations on exposure to respirable crystalline silica and/or any referral to a medical specialist.

Sample Form 1 – WRITTEN MEDICAL REPORT FOR EMPLOYEE

EMPLOYEE NAME: _____ **DATE OF EXAMINATION:** _____

TYPE OF EXAMINATION:
[ ] Initial examination [ ] Periodic examination [ ] Specialist examination
[ ] Other: _____

RESULTS OF MEDICAL EXAMINATION:

Physical Examination –	[ ] Normal	[ ] Abnormal (see below)	[ ] Not performed
Chest X-Ray –	[ ] Normal	[ ] Abnormal (see below)	[ ] Not performed
Breathing Test (Spirometry) –	[ ] Normal	[ ] Abnormal (see below)	[ ] Not performed
Test for Tuberculosis –	[ ] Normal	[ ] Abnormal (see below)	[ ] Not performed
Other:_____	[ ] Normal	[ ] Abnormal (see below)	[ ] Not performed

Results reported as abnormal: _____
_____

[ ] Your health may be at increased risk from exposure to respirable crystalline silica due to the following:
_____

RECOMMENDATIONS:
[ ] No limitations on respirator use
[ ] Recommended limitations on use of respirator: _____
[ ] Recommended limitations on exposure to respirable crystalline silica: _____
_____

Dates for recommended limitations, if applicable: _____ (MM/DD/YYYY) to _____ (MM/DD/YYYY)

[ ] I recommend that you be examined by a Board Certified Specialist in Pulmonary Disease or Occupational Medicine

[ ] Other recommendations*:
_____
_____

Your next periodic examination for silica exposure should be in: [ ] 3 years [ ] Other: _____ (MM/DD/YYYY)

Examining Provider: _____ (signature) Date: _____

Provider Name: _____
Office Address: _____ Office Phone: _____

*These findings may not be related to respirable crystalline silica exposure or may not be work-related, and therefore may not be covered by the employer. These findings may necessitate follow-up and treatment by your personal physician.

Sample Form 2 – WRITTEN MEDICAL OPINION FOR EMPLOYER

EMPLOYER: _____

EMPLOYEE NAME: _____ **DATE OF EXAMINATION:** _____

TYPE OF EXAMINATION:
[ ] Initial examination [ ] Periodic examination [ ] Specialist examination
[ ] Other: _____

USE OF RESPIRATOR:
[ ] No limitations on respirator use
[ ] Recommended limitations on use of respirator: _____

Dates for recommended limitations, if applicable: _____ to _____
MM/DD/YYYY MM/DD/YYYY

The employee has provided written authorization for disclosure of the following to the employer (if applicable):

[ ] This employee should be examined by an American Board Certified Specialist in Pulmonary Disease or Occupational Medicine
[ ] Recommended limitations on exposure to respirable crystalline silica: _____

_____

Dates for exposure limitations noted above: _____ to _____
MM/DD/YYYY MM/DD/YYYY

NEXT PERIODIC EVALUATION: [ ] 3 years [ ] Other: _____
MM/DD/YYYY

Examining Provider: _____ Date: _____
(signature)
Provider Name: _____ Provider's specialty: _____

Office Address: _____ Office Phone: _____

[ ] I attest that the results have been explained to the employee.

The following is required to be checked by the Physician or other Licensed Health Care Professional (PLHCP):
[ ] I attest that this medical examination has met the requirements of the medical surveillance section of the OSHA Respirable Crystalline Silica standard (§ 1910.1053(h) or 1926.1153(h)).

Sample Form 3 – AUTHORIZATION FOR CRYSTALLINE SILICA OPINION TO EMPLOYER

This medical examination for exposure to crystalline silica could reveal a medical condition that results in recommendations for (1) limitations on respirator use, (2) limitations on exposure to crystalline silica, or (3) examination by a specialist in pulmonary disease or occupational medicine. Recommended limitations on respirator use will be included in the written opinion to the employer. If you want your employer to know about limitations on crystalline silica exposure or recommendations for a specialist examination, you will need to give authorization for the written opinion to the employer to include one or both of those recommendations.

I hereby authorize the opinion to the employer to contain the following information, if relevant (please check all that apply):

☐ Recommendations for limitations on crystalline silica exposure

☐ Recommendation for a specialist examination

OR

☐ I do not authorize the opinion to the employer to contain anything other than recommended limitations on respirator use.

Please read and initial:

___ I understand that if I do not authorize my employer to receive the recommendation for specialist examination, the employer will not be responsible for arranging and covering costs of a specialist examination.

_____
Name (printed)

_____ _____
Signature Date

Respirator Fit-Testing

All filtering facepiece (dust mask) and elastomeric (tight-fitting) respirators must be fit-tested. Two fit-testing options are available:

1. Qualitative Fit-Testing (QLFT)
2. Quantitative Fit-Testing (QNFT)

Qualitative Fit Test

The qualitative fit test is performed using a taste test (saccharin or Bitrex®), an odor test (banana oil/iso amyl acetate), or a reaction test to irritant smoke. A qualitative fit test kit includes a hood and odorant. The testing must be performed by a qualified person and can only be used to assess an employee's fit up to an Assigned Protection Factor (APF) of 10.

3M FT-10 Qualitative Fit Test Kit

Dynatech FitTester 3000

Quantitative Fit Test

The quantitative fit test uses a machine to measure the leakage of particles through the face seal or the change in pressure due to air leakage. The three test options include corn oil mist particle counting, condensation nuclei counter (CNC) or PortaCount, and the Dynatech FitTester 3000, which measures pressure difference. Each test requires an adapter to allow sampling inside the mask. Quantitative fit tests must be performed by a qualified person.

An employee must be re-fitted annually or sooner if he/she experiences any of the following:

- Substantial weight gain or loss (> 10% of their body weight);
- Cosmetic surgery;
- Extensive dental work; or
- Concerns that the respirator does not fit properly.

Respirator User Seal Check

A respirator user should verify that the respirator has been properly positioned on the face to ensure a proper seal. A user seal check is not a substitute for a respirator fit test. A user seal check must be performed frequently to confirm that the respirator has been donned correctly. It may be performed both negatively and positively.

- ***To perform a negative pressure fit check:*** cover the inlets to the filters or cartridges, and inhale to cause the facepiece to pull against the face. If the employee holds his/her breath and the facepiece relaxes, then there is a substantial leak, and requires either another mask or an adjustment to the mask.
- ***To perform a positive pressure fit check:*** cover or block the exhalation valve and blow out steadily, as if blowing out a candle. The facepiece should expand, but no air should be felt leaking out. This requires either another mask or an adjustment to the mask.

Positive Pressure Fit Check

Negative Pressure Fit Check

Respirator Cleaning and Maintenance

The manufacturer's guidance for cleaning and sanitizing a respirator should always be followed and is included with the packaging of all products. OSHA also provides general cleaning and sanitizing guidance in **Appendix B-2 to § 1910.134: Respirator Cleaning Procedures.**

Procedures for Cleaning Respirators

A. Remove filters, cartridges, or canisters. Disassemble facepieces by removing speaking diaphragms, demand and pressure-demand valve assemblies, hoses, or any components recommended by the manufacturer. Discard or repair any defective parts.

B. Wash components in warm (43 deg. C [110 deg. F] maximum) water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.

C. Rinse components thoroughly in clean, warm (43 deg. C [110 deg. F] maximum) running water. Drain.

D. If the cleaner used does not contain a disinfecting agent, then the respirator components should be immersed for two minutes in one of the following:

   1. Hypochlorite solution (50 ppm of chlorine) made by adding approximately one milliliter of laundry bleach to one liter of water at 43 deg. C (110 deg. F); or,

   2. Aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams ammonium and/or potassium iodide/100 cc of 45% alcohol) to one liter of water at 43 deg. C (110 deg. F); or,

   3. Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.

E. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on facepieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if they are not completely removed.

F. Components should be hand-dried with a clean lint-free cloth, or air-dried.

G. Reassemble facepiece, replacing filters, cartridges, and canisters if necessary.

H. Test the respirator to ensure that all components work properly.

Appendix D, Information for Employees using Respirators when not required under Standard (Mandatory)

Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for workers. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the worker. Sometimes, workers may wear respirators to avoid exposures to hazards, even if the amount of hazardous substance does not exceed the limits set by OSHA standards. If your employer provides respirators for your voluntary use, or if you provide your own respirator, you need to take certain precautions to be sure that the respirator itself does not present a hazard.

When using a respirator, do the following:

1. Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirators limitations.
2. Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety and Health of the U.S. Department of Health and Human Services, certifies respirators. A label or statement of certification should appear on the respirator or respirator packaging. It will tell you what the respirator is designed for and how much it will protect you.
3. Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, or very small solid particles of fumes or smoke.
4. Keep track of your respirator so that you do not mistakenly use someone else's respirator.

Discussion Points

- **OSHA Hazard Communication Standard.**
- **Required training under the silica standard.**
- **When employees must be trained and how often.**
- **Making a copy of the standard available.**
- **Competent person responsibilities.**

Employers must train and inform employees covered by the silica standard about respirable crystalline silica hazards and the methods the employer uses to limit exposure to those hazards. Employers must pay for the costs of training and employee participation in training.

Silica hazard training.

OSHA Hazard Communication Standard

Employers must comply with the OSHA Hazard Communication Standard (HCS) (29 CFR 1910.1200). HCS requires employers to inform employees about hazardous chemicals in the workplace, such as respirable crystalline silica, through their written hazard communication programs. Written hazard communication programs must describe how requirements for container labels, safety data sheets (SDSs), and employee training will be met.

As part of its hazard communication program for respirable crystalline silica, an employer must address, at a minimum, these health hazards: cancer, lung effects, immune system effects, and kidney effects.

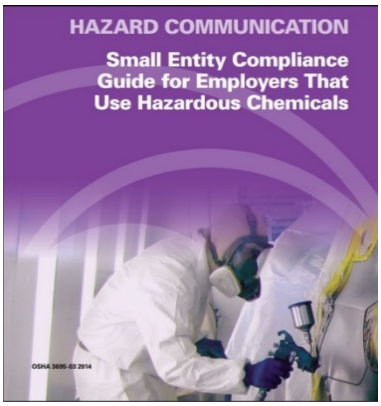
Product label showing health hazards attributed to silica.

Hazard Communication Training

Under the Hazard Communication Standard, employers must:

- Inform employees about the general requirements of HCS, as well as where and how they can view the employer's written hazard communication program, list of hazardous chemicals, and SDSs.
- Train employees about how the presence or release of hazardous chemicals in the workplace are detected. In the case of respirable crystalline silica, this could include methods the employer uses to measure exposure, such as air sampling or objective data. If employers are using Table 1, they may train employees to recognize that an increase in visible dust is a sign that a control may not be working properly.
- Educate employees about the details of the workplace-specific hazard communication program developed by the employer, such as container labels, the workplace labeling system, SDSs (including the manner in which the information is presented), and how employees can access and use hazard information.

See OSHA's ***HAZARD COMMUNICATION: Small Entity Compliance Guide for Employers that Use Hazardous Chemicals [OSHA Publication #3695]*** for more information about preparing a written hazard communication program and employer requirements for labeling, SDSs, and training.



OSHA Publication #3695

Training Topics

Employers must ensure that employees trained under the silica standard demonstrate knowledge and understanding of:

1. Health hazards such as cancer, lung effects, immune system effects, and kidney effects.
2. Workplace tasks that could expose employees to respirable crystalline silica, especially those listed in Table 1.
3. Measures the employer has implemented to protect employees from respirable crystalline silica exposure, including engineering controls, work practices, or respirators.

When Employees must be Trained

Employees must be trained at the time they are assigned to a position or task involving exposure to respirable crystalline silica.

Additional training must be provided as often as necessary to ensure that employees know and understand respirable crystalline silica hazards and the protections available in their workplace. Examples of when additional training would be required include:

- When the employer requires an employee to perform a task that is new to the employee;
- When the employer introduces new protections (for example, transition from a wet method control to a dust collection system); or
- When an employee is working in a manner that suggests he or she requires re-training.

Making a Copy of the Standard Available

Employers must make a copy of the respirable crystalline silica standard available at no cost to each employee covered by the standard. This may involve distribution of the standard or posting it in a place for employees to view.

Competent Person

Competent person refers to an individual who is capable of identifying existing and foreseeable respirable crystalline silica hazards in the workplace and who has authorization to take prompt corrective measures to eliminate or minimize them. The competent person must have the knowledge and ability necessary to fulfill the responsibilities set forth in paragraph (g) of OSHA's Respirable Crystalline Silica standard, 29 CFR 1926.1153.

1926.1153(g) – Written Exposure Control Plan

The employer shall establish and implement a written exposure control plan that contains at least the following elements:

- 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.

Employer Responsibilities

- ✓ The employer shall review and evaluate the effectiveness of the written exposure control plan at least annually and update it as necessary.
- ✓ The employer shall make the written exposure control plan readily available for examination and copying, upon request, to each employee covered by this section, their designated representatives, the Assistant Secretary and the Director.
- ✓ The employer shall designate a competent person to make frequent and regular inspections of job sites, materials, and equipment to implement the written exposure control plan.

Company: _____ **Date:** _____

Person Completing the Plan, Title: _____

Competent Person: _____

Job site/location: _____

Description of Task:

_____

_____

(Select a specified exposure control method, refer to Table 1 of §1926.1153 – Equipment/Task. If not on Table 1, then briefly describe task and complete "Alternative Exposure Control Method" section of this form.)

☐ **Outdoors** ☐ **Indoors or Enclosed** ☐ **≥ 4 hours/shift** ☐ **< 4 hours/shift**

Engineering Controls:

_____

_____

(Any deviation from Table 1 = air monitoring or objective data is required)

(Wet methods, continuous water feed, local exhaust ventilation w/ HEPA filters, commercially available shrouds, commercial dust collection system, cyclone pre-separator/filter cleaning system, surfactant used, enclosed cab w/ fresh climate controlled air to operator, employees outside of cabs applying water/dust suppressants, equipment maintained to minimize dust emissions.)

Work Practices:

_____

_____

(Maintain equipment functionality – cleaned/spare filters, hoses to start; good connections; hoses with no holes, kinks, permanent bends, crushed; power source available; water source available, ensure ventilation is 25 cfm/inch of wheel diameter; water/exhaust ventilation lines safe from damage; shrouds/cowls fit correctly and not damaged; follow Manufacturer's instruction for filter cleaning/change out.)

Respiratory protection: ☐ **Required** ☐ **Not Required** ☐ **Voluntary Use**

_____

(Describe respirator if used: Manufacturer, Type & APF)

☐ **Respirator Medical Evaluation on File**

☐ **Respirator Fit Test Complete**

☐ **Employer Provided Appendix D of §1910.134 (Voluntary Use Only)**

Continue →

Housekeeping:

(Dust containing silica on work surfaces/equipment must be cleaned up using wet methods of HEPA equipped vacuum, no use of compressed air or dry sweeping for removing dust and debris containing silica, dispose of used vacuum bags in a closed sealed container.)

Procedures Used to Restrict Access to Work Area:

(Signage, barricades, enclosures, spotters, work when area is cleared of other contractors to reduce risk of exposure.)

- Alternative Exposure Control Method -

Objective Data Use: ☐ Yes ☐ No

Data Source and Explanation:

Data conditions from the source exactly matches the work conditions? ☐ Yes ☐ No

(Same conditions, equipment, process, controls, material silica %, environmental.)

Scheduled Air Monitoring: ☐ Yes ☐ No

Data Source and Explanation:

- ✓ **Review and update this plan annually.**
- ✓ **Keep a copy of this plan at the jobsite.**
- ✓ **Provide this plan of action to the Controlling Contractor.**
- ✓ **Review this plan with all involved employees.**