

# Respirable Silica Exposure in the Construction Industry



**University of South Florida**

<http://usfoticer.org/silica-training>

Susan Harwood Grant: SH-29661-SH6

## WELCOMES

### RULES

In order to maximize each students learning experience, we have prepared a few “ground rules” for this class. We need your individual cooperation in order for the class to be a success for everyone.

1. **Daily Attendance** and returning on time for classes will assist the instructor in providing a quality course. Attendance will be taken at the beginning and at the end of the day through the length of the course.
2. **Absentees:** Course participants should inform the instructor should you need to be absent. This includes departure prior to the course completion time.
3. **Medical Services:** Individuals who feel they need medical attention should inform the instructor who will assist them.
4. **Tape Recorders** or other recording devices sare not allowed during the training
5. **CELL PHONES AND PAGERS** must be turned off or put on vibrate mode during class.
6. **Drinking of Alcoholic Beverages** are not permitted in the classrooms. Individuals appearing in class “under the influence” will be asked to leave.
7. **Smoking** and **Tobacco products** are not permitted in the classrooms.
8. **Breaks** are scheduled at regular intervals in all courses. Beverages are permitted in the classrooms.
9. **Exits:** The instructor will tell each class where the emergency exits are located.
10. **Standard of Conduct:** Individuals are asked to treat others with respect, and maintain an environment which allows students to perform their work free from all types of discrimination and harassment. Should you become aware of inappropriate conduct, please bring it to the attention of the class instructor.

## Silica Health Hazard in Construction Industry

Day 1		
TIME	Minutes	Topic
8:00-8:50	50	Course Opening, Objectives, Introductions, Housekeeping, and Pre-test
8:50-9:50	60	OSHA ACT, Silica Standard, Table 1, and Overview
10 minutes		Break
10:00-11:30	90	Silica Health Hazard Information and Medical Surveillance
40 minutes		Lunch
12:10-1:40	90	Specific control Methods - Training and group activities
1:40-2:25	45	Respirator selection, use, and care and Lab -Part I
10 minutes		Break
2:35-3:20	45	Respirator selection, use, and care and Lab -Part II
3:20-4:00	40	House Keeping Techniques
4:00-4:30	30	Post-test and course evaluation
<div> <div>7.5</div> <div><b>Total Course Contact Hours</b></div> <div>7.5</div> </div>		
457.5		

# **Module 1 Student Guide**

## **Respirable Silica in The Construction Industry Course Opening and Overview 50 minute module**

### **Overview**

This is a one day training session intended to educate frontline employees and foremen about OSHA's new silica standard for the construction industry. This course will offer an overview of the new silica standard, as well as information on how to recognize, avoid and abate silica dust hazards. Participants will also learn allowable housekeeping techniques, as well as participating in a hands-on workshop regarding respiratory protection use. Participant's level of knowledge will be tested by administering a pretest and post-test.

This course does not qualify participants as a competent person or certify anyone on silica. It is being offered as an educational program for understanding basic requirements of the updated silica standard on respirable silica.

### **Topics to be covered**

- a. Course Opening
- b. Objectives
- c. Introductions
- d. Class rules
- e. Attendance
- f. Pre-test

### **Objectives**

Upon completion of this module student should be able to:

- a. Identify the instructor.
- b. Know the location of the restrooms and break area.
- c. Understand and explain the class attendance rule.
- d. Understand their level of knowledge on silica, based on the pretest.

## **Module 2 Student Guide**

### **Respirable Silica in The Construction Industry OSH ACT, Silica Standard, Table 1, and Overview 1 hour module**

#### **Overview**

This course module will offer an overview of the Susan Harwood Grant Program, OSHA's role in setting standards, an overview of the new silica standard and terms that will be used throughout the course, as well as an introduction to Table 1 of the Silica Standard. Participants shall work examples on respiratory protection using table 1.

#### **Topics to be covered**

- a. Objectives
- b. Susan Harwood Grant
- c. OSHA
- d. Silica Rule time line
- e. Silica
- f. Definitions
- g. Table 1
- h. Examples
- i. Housekeeping
- j. Competent person
- k. Medical surveillance
- l. Summary

#### **Objectives**

Upon completion of this module student should be able to:

- a. Describe the purpose of the Susan Harwood Training Grant Program
- b. List basic Workers Rights and Employer Responsibilities under the OSH Act
- c. Discuss what gives the employees the right to voice safety and health concerns free from retaliation?
- d. Describe How to file a complaint
- e. Describe respirable crystalline silica?
- f. Discuss how to use table?

## **Module 3 Student Guide**

### **Respirable Silica in The Construction Industry Silica Health Hazard Information and Medical Surveillance 1.5 hours module**

#### **Overview**

This course module will offer an overview the history of silica exposures. It will provide a basic understanding of the respiratory system and give insight as to how silica affects the systems. There are examples of silicosis and lung cancers from short and long exposures. The module will discuss the standard requirements to prevent exposure along with the requirements for medical evaluations, training and recordkeeping.

#### **Topics to be covered**

- a. Susan Harwood Grant
- b. Objectives
- c. History of silica
- d. Health effects of silica
- e. Standard requirements related to health
- f. Training requirements
- g. Recordkeeping requirements
- h. Summary

#### **Objectives**

Upon completion of this module student should be able to:

- a. Describe the requirements of the new silica standard for construction
- b. Identify the major differences between the old and new silica standard
- c. Identify the areas of the new standard that trainees should be concerned with

## **Module 4 Student Guide**

### **Respirable Silica in The Construction Industry Specific control Methods - Training and group activities 1.5 hours module**

#### **Overview**

This module discusses specific control methods from Table 1 based on types of tools and time periods of exposures from specific task. It covers the changes from the past standard to the new levels. The participants will have the opportunity to review example scenarios to practice selecting proper protective measure to reduce exposures.

#### **Topics to be covered**

- a. Susan Harwood Grant
- b. Objectives
- c. Historical information
- d. Major changes
- e. Control methods
- f. Group activity
- g. Summary

#### **Objectives**

Upon completion of this module student should be able to:

- a. Describe the purpose of the Susan Harwood Training Grant Program
- b. Trainees will be able to discuss health hazards of respirable silica
- c. Trainees will be able to identify silica dust hazards and controls in the workplace
- d. Identify health risks, both short and long-term, associated with silica exposure
- e. Identify activities likely to expose workers to silica exposure
- f. Identify the differences between engineering and administrative controls and PPE

# Scenarios

1. A group of people are working on a roadway installing a traffic light sensor. The supervisor has instructed them to cut several lines into the road to place the wires under the surface of the road. They will be using a walk behind saw. The saw is equipped with a standard tank and blade.
  - a. What is the hazard(s)?
  - b. What steps are required to control the hazard(s)?
  - c. What controls need to be in place?
  - d. What respiratory protection would be required and why?
2. Two brick layers are working on building a new wall on a new structure. They are working from the outside of the wall. On the corner of the building every other brick will require cutting to ensure a proper fit. They will use a stationary masonry saw.
  - a. What is the hazard(s)?
  - b. What steps are required to control the hazard(s)?
  - c. What controls need to be in place?
  - d. What respiratory protection would be required and why?



3. A drywall installer is working in a bathroom installing cement board. As he is installing the boards, he must make cuts and holes in the board. He uses a handheld power saw and drill in the bathroom to make the cuts. His work will take 3 hours to complete the job.
  - a. What is the hazard(s)?
  - b. What steps are required to control the hazard(s)?
  - c. What controls need to be in place?
  - d. What respiratory protection would be required and why?
4. A crew of form workers are removing form work, when they discover some damage that will need to be removed and repaired. This will require them to chisel out a large section of the cement and fill the area with new cement. They will use a handheld powered hammer chisel. This work is outside and will take 7 hours.
  - a. What is the hazard(s)?
  - b. What steps are required to control the hazard(s)?
  - c. What controls need to be in place?
  - d. What respiratory protection would be required and why?

5. Two tuckpoint employees are working on removing the mortar between the bricks on a building using handheld grinders. They will be working on this project for several days. All the work is on the exterior of the building. The work is from ground level to 12 feet above the ground.
  - a. What is the hazard(s)?
  - b. What steps are required to control the hazard(s)?
  - c. What controls need to be in place?
  - d. What respiratory protection would be required and why?
6. A heavy equipment operator is working on a site with heavy rock deposits and is scraping and ripping the ground to prepare it for construction. There are several other vehicles in the area conducting the same operations. This project will take 2 weeks.
  - a. What is the hazard(s)?
  - b. What steps are required to control the hazard(s)?
  - c. What controls need to be in place?
  - d. What respiratory protection would be required and why?

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

<b>TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA</b>			
<b>Equipment / Task</b>	<b>Engineering and Work Practice Control Methods</b>	<b>Required Respiratory Protection and Minimum Assigned Protection Factor (APF)</b>	
		<b>≤ 4 hours /shift</b>	<b>&gt; 4 hours /shift</b>
(iv) Walk-behind saws	<p>Use saw equipped with integrated water delivery system that continuously feeds water to the blade.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <ul style="list-style-type: none"> <li>– When used outdoors.</li> <li>– When used indoors or in an enclosed area.</li> </ul>	<p>None</p> <p>APF 10</p>	<p>None</p> <p>APF 10</p>
(v) Drivable saws	<p>For tasks performed outdoors only:</p> <p>Use saw equipped with integrated water delivery system that continuously feeds water to the blade.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p>	None	None
(vi) Rig-mounted core saws or drills	<p>Use tool equipped with integrated water delivery system that supplies water to cutting surface.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p>	None	None

**TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS  
WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA**

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(vii) Handheld and stand-mounted drills (including impact and rotary hammer drills)	<p>Use drill equipped with commercially available shroud or cowl with dust collection system.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <p>Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism.</p> <p>Use a HEPA-filtered vacuum when cleaning holes.</p>	None	None
(viii) Dowel drilling rigs for concrete	<p>For tasks performed outdoors only:</p> <p>Use shroud around drill bit with a dust collection system. Dust collector must have a filter with 99% or greater efficiency and a filter-cleaning mechanism.</p> <p>Use a HEPA-filtered vacuum when cleaning holes.</p>	APF 10	APF 10

<b>TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA</b>			
<b>Equipment / Task</b>	<b>Engineering and Work Practice Control Methods</b>	<b>Required Respiratory Protection and Minimum Assigned Protection Factor (APF)</b>	
		<b>≤ 4 hours /shift</b>	<b>&gt; 4 hours /shift</b>
(ix) Vehicle-mounted drilling rigs for rock and concrete	Use dust collection system with close capture hood or shroud around drill bit with a low-flow water spray to wet the dust at the discharge point from the dust collector.	None	None
	OR  Operate from within an enclosed cab and use water for dust suppression on drill bit.	None	None

**TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS  
WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA**

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

**TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS  
WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA**

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xi) Handheld grinders for mortar removal (i.e., tuckpointing)	<p>Use grinder equipped with commercially available shroud and dust collection system.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <p>Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism.</p>	APF 10	APF 25
(xii) Handheld grinders for uses other than mortar removal	<p>For tasks performed outdoors only:</p> <p>Use grinder equipped with integrated water delivery system that continuously feeds water to the grinding surface.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <p>OR</p>	None	None



**TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS  
WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA**

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
	<p>Use grinder equipped with commercially available shroud and dust collection system.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <p>Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism.</p> <ul style="list-style-type: none"> <li>– When used outdoors.</li> <li>– When used indoors or in an enclosed area.</li> </ul>	<p>None</p> <p>None</p>	<p>None</p> <p>APF 10</p>

**TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS  
WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA**

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xiii) Walk-behind milling machines and floor grinders	<p>Use machine equipped with integrated water delivery system that continuously feeds water to the cutting surface.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <p>OR</p>	None	None
	<p>Use machine equipped with dust collection system recommended by the manufacturer.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <p>Dust collector must provide the air flow recommended by the manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism.</p> <p>When used indoors or in an enclosed area, use a HEPA-filtered vacuum to remove loose dust in between passes.</p>	None	None

<b>TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS</b> <b>WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA</b>			
Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xiv) Small drivable milling machines (less than half-lane)	Use a machine equipped with supplemental water sprays designed to suppress dust. Water must be combined with a surfactant.  Operate and maintain machine to minimize dust emissions.	None	None

**TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS  
WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA**

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xv) Large drivable milling machines (half-lane and larger)	For cuts of any depth on asphalt only:  Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust.  Operate and maintain machine to minimize dust emissions.	None	None
	For cuts of four inches in depth or less on any substrate:  Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust.  Operate and maintain machine to minimize dust emissions.	None	None
	OR  Use a machine equipped with supplemental water spray designed to suppress dust. Water must be combined with a surfactant.  Operate and maintain machine to minimize dust emissions.	None	None

<b>TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA</b>			
Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xvi) Crushing machines	<p>Use equipment designed to deliver water spray or mist for dust suppression at crusher and other points where dust is generated (e.g., hoppers, conveyers, sieves/sizing or vibrating components, and discharge points).</p> <p>Operate and maintain machine in accordance with manufacturer's instructions to minimize dust emissions.</p> <p>Use a ventilated booth that provides fresh, climate-controlled air to the operator, or a remote control station.</p>	None	None
(xvii) Heavy equipment and utility vehicles used to abrade or fracture silica-containing materials (e.g., hoe-ramming, rock ripping) or used during demolition activities involving silica-containing materials	<p>Operate equipment from within an enclosed cab.</p> <p>When employees outside of the cab are engaged in the task, apply water and/or dust suppressants as necessary to minimize dust emissions.</p>	None	None

<b>TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA</b>			
<b>Equipment / Task</b>	<b>Engineering and Work Practice Control Methods</b>	<b>Required Respiratory Protection and Minimum Assigned Protection Factor (APF)</b>	
		<b>≤ 4 hours /shift</b>	<b>&gt; 4 hours /shift</b>
(xviii) Heavy equipment and utility vehicles for tasks such as grading and excavating but not including: demolishing, abrading, or fracturing silica-containing materials	Apply water and/or dust suppressants as necessary to minimize dust emissions.	None	None
	OR  When the equipment operator is the only employee engaged in the task, operate equipment from within an enclosed cab.	None	None

range (e.g., MERV-16 or better); and

## **Module 5 Student Guide**

### **Respirable Silica in The Construction Industry Respirator selection, use, and care and Lab -Part I .75 hour module**

#### **Overview**

This module discusses specific methods to control and reduce exposure to silica dust at worksites. Using work practices and specific tools following manufacture requirements will reduce the amount of silica exposure. Table 1 addresses when to wear respirators to protect employees based on the amount of possible exposure. Making the correct selection of respiratory protection is critical for the employees working in high hazard areas. The participants will have the chance to use scenarios that will let them practice the skill of determining the proper method to reduce the exposure to the workers.

This course does not meet the requirements of respirator training.

#### **Topics to be covered**

- a. Susan Harwood Grant
- b. Objectives
- c. Methods of control
- d. Reduction of silica exposure
- e. Work practice controls
- f. Respirators
- g. Scenarios
- h. Summary

#### **Objectives**

Upon completion of this module student should be able to:

- a. Trainees will be able to describe the requirements for *Table 1* tasks.
- b. Identify the significance of including the specified exposure control methods.
- c. Identify tasks likely to expose workers to silica exposure.
- d. Identify ways to avoid and abate hazards associated with silica exposure.
- e. Identify requirements for engineering controls
- f. Identify appropriate work practice controls.
- g. Identify requirements for respiratory protection.

## **Module 6 Student Guide**

### **Respirable Silica in The Construction Industry Respirator selection, use, and care and Lab -Part II .75 hour module**

#### **Overview**

This module discusses the importance of using respiratory protection in situations with silica dust that is respirable. It is important to make the correct selection for the type of respiratory protection based on the amount and possible exposure during a task. Factors that influence this are location, amount of silica present, method used to cut or break the material. Respirator use requires proper training to be used correctly. Anyone that is required to wear respiratory protection must do so correctly to reduce exposure. The wearer must also be trained in the proper care and maintenance of the respirator to ensure that it is providing the proper level of protection and not adding to the exposure or negative effects. Part of this training is to properly inspect the respirator before each use. If there is damage or it is not going to provide the proper level of protection it needs to be removed from service or replaced.

This course does not meet the requirements of respirator training.

#### **Topics to be covered**

- a. Susan Harwood Grant
- b. Objectives
- c. Importance of Respiratory Protection
- d. Basic types of Respirators
- e. Proper use of Respiratory Protection
- f. Maintenance and care
- g. Exercise
- h. Summary

#### **Objectives**

Upon completion of this module student should be able to:

- a. Trainees will be able to demonstrate basic knowledge and use of proper respiratory protection equipment
- b. Identify basic types of PPE used to reduce health hazards associated with silica exposure
- c. Identify importance of respiratory protection
- d. Identify proper use of respiratory protection
- e. Identify when to perform and how to perform a user seal check
- f. Identify how to maintain and care for respiratory protection
- g. Identify when it is time to replace/change a respirator



## **Module 7 Student Guide**

### **Respirable Silica in The Construction Industry House Keeping Techniques 40 Minutes module**

#### **Overview**

This module discusses proper housekeeping techniques and hazards associated with improperly cleanup of respirable silica dust. This section covers the proper methods of using wet, or HEPA vacuuming methods to remove the hazardous dust. Participants will have the chance to practice some of the proper methods using a safe product and the correct techniques to reduce exposure.

#### **Topics to be covered**

- a. Objectives
- b. Housekeeping techniques
  - a. Dry brushing/ sweeping
  - b. HEPA vacuuming
  - c. Wet sweeping
  - d. Compressed air
- c. PPE
- d. Exercise
- e. Summary

#### **Objectives**

Upon completion of this module student should be able to:

- a. Trainees will be able to identify appropriate housekeeping techniques to reduce risk of silica dust exposure.
- b. Identify general housekeeping techniques that are allowed and not allowed.
- c. Identify when housekeeping measures are inappropriate and/or ineffective.
- d. Identify appropriate alternatives to wet sweeping or HEPA vacuuming.