Introduction

• Welcome to this course!
  – Respirable Crystalline Silica for Exposed Construction Workers

• Intended for:
  – Construction workers
  – Construction foremen
  – Construction managers

• Duration: 60 minutes
Introduction

• Over the next hour, this course will provide information on controlling silica exposures in construction, including:
  – OSHA’s standard on respirable crystalline silica in construction
  – Introduction to crystalline silica hazards
  – Work tasks and equipment that may put you at risk
  – Engineering controls and proper work practices
  – Respirators
  – Housekeeping practices
  – Employer responsibilities
Introduction

By the end of this course, you will be able to:

• Explain what respirable crystalline silica is and the health hazards associated with it
• Identify the construction activities and equipment commonly linked to respirable crystalline silica
• List the control measures and respiratory protection required under OSHA’s standard on respirable crystalline silica
• Recognize employer responsibilities and employee rights under OSHA’s standard on respirable crystalline silica
Introduction

OSHA’s respirable crystalline silica rule

• 29 CFR 1926.1153
  – 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/m³) as an 8-hour time-weighted average (TWA) under any foreseeable conditions.”

**TIP:** Evaluating silica dust in the air requires air monitoring. The purpose of air monitoring is to identify and quantify airborne contaminants in order to determine the level of worker protection needed. Initial screening for identification is often qualitative, i.e., the contaminant, or the class to which it belongs, is demonstrated to be present but the determination of its concentration (quantification) must await subsequent testing. Two principal approaches are available for identifying and/or quantifying airborne contaminants:
  • The onsite use of direct-reading instruments.
  • Laboratory analysis of air samples obtained by gas sampling bag, filter, sorbent, or wet contaminant collection methods.
Introduction

• Key provisions of the standard
  • Reduces the permissible exposure limit (PEL) for respirable crystalline silica to 50 micrograms per cubic meter of air, averaged over an 8-hour shift
  • Requires employer compliance
    – Engineering controls
    – Respirators
    – Limiting worker access to high exposure areas
    – Written exposure control plan
    – Medical exams and health information
    – Training
  • Provides flexibility to help employers protect workers

**TIP:** The permissible exposure limit (PEL or OSHA PEL) is a legal limit in the United States for exposure of an employee to a chemical substance or physical agent such as loud noise. Permissible exposure limits are established by the Occupational Safety and Health Administration (OSHA). For chemicals, the chemical regulation is usually expressed in parts per million (ppm), or sometimes in micrograms per cubic meter (μg/m³). Units of measure for physical agents such as noise are specific to the agent. A PEL is usually given as a time-weighted average (TWA), although some are short-term exposure limits (STEL) or ceiling limits. A TWA is the average exposure over a specified period of time, usually a nominal eight hours.
Introduction

• June 23, 2016
  – OSHA’s respirable crystalline silica standard for construction goes into effect!

• June 23, 2017
  – Start of compliance obligations to this standard (except methods of sample analysis)

• June 23, 2018
  – Start of requirements for sample analysis methods
Introduction

• Pre-drill review

29 CFR 1926.1153: OSHA’s respirable crystalline silica standard for construction
• Reduces the permissible exposure limit (PEL) for respirable crystalline silica to 50 micrograms per cubic meter of air, averaged over an 8-hour shift
• Employer responsibilities:
  – Engineering controls
  – Respirators
  – Limiting worker access to high exposure areas
  – Written exposure control plan
  – Medical exams and health information
  – Training

• Schedule

  • June 23, 2016: Effective date of OSHA’s respirable crystalline silica standard
  • June 23, 2017: Compliance obligations begin (except methods of sample analysis)
  • June 23, 2018: Compliance obligation begins for sample analysis methods
What are Silica Hazards?

What is crystalline silica?

- Crystalline silica
  - A basic component of soil, sand, granite, and many other minerals.
  - Quartz is the most common form of crystalline silica
  - Cristobalite and tridymite are two other forms of crystalline silica

**TIP:** Quartz, the most common form of silica, is a component of sand, stone, rock, concrete, brick, block, and mortar.
What are Silica Hazards?

What is respirable crystalline silica?

• “Respirable” crystalline silica
  – Quartz, cristobalite, and/or tridymite contained in airborne particles that are determined to be respirable (breathable) by a compliant sampling device
• Crystalline silica can become respirable size particles from worker activities such as:
  – Chipping
  – Cutting
  – Drilling
  – Grinding

**TIP:** You may see instances when we use the shortened term “silica” to stand for “respirable crystalline silica” in this course.

With that in mind, what does “respirable” mean?

Inhalable particulate dust is that fraction of a dust cloud that can be breathed into the nose or mouth. Examples of dusts for which any inhalable particle is of concern include certain hardwood dusts (which may cause nasal cancer), and dusts from grinding lead containing alloys (which can be absorbed and cause systemic poisoning). Respirable particulate dust is that fraction of inhaled airborne particles that can penetrate down deep into the gas-exchange region of the lungs. Examples of dusts for which the respirable fraction offers greatest hazard include quartz and other dusts containing free crystalline silica dust, and many others. A respirable particle is too small to be seen with the unaided eye. So, even if you don’t see the dust, it may still be there in the breathable air.
What are Silica Hazards?

History of silica hazards

- Worker deaths due to silica-related diseases in the 1930s
- Standards set in 1971 but not adequate to protect workers from silica-related diseases
- The standard, with substantial changes, was initially proposed in 2013 based on:
  - Scientific evidence
  - Industry consensus
  - Extensive stakeholder input
What are Silica Hazards?

Silica-related diseases

• Limiting workers from exposure to respirable crystalline silica to curb:
  – Lung cancer
  – Silicosis
  – Chronic obstructive pulmonary disease
  – Kidney disease
What are Silica Hazards?

Silicosis
• The formation of scar tissue in the lungs
• Potentially disabling or fatal ailment
• No cure
• Also makes you more susceptible to lung infections like TB
• Smoking adds to the damage of silicosis
What are Silica Hazards?

Silicosis types and symptoms

**Chronic/classic silicosis**
- The most common type
- Occurs after 15-20 years of moderate to low exposure
- Symptoms, such as shortness of breath and poor oxygen intake, might not be obvious

**Accelerated silicosis**
- Occurs after 5-10 years of high exposure
- Symptoms include shortness of breath, weakness, and weight loss

**Acute silicosis**
- Occurs after a few months to two years of extremely high exposure
- Symptoms include disabling shortness of breath, weakness, weight loss, often leading to death
What are Silica Hazards?

Who is exposed to silica hazards?

• Approximately 2.3 million workers exposed
  – Two million are construction workers
  – Working with silica-containing materials such as concrete and stone

• What employers have done about this issue: Water and vacuum systems as traditional controls
Impact of OSHA’s respirable crystalline silica rule

- Estimated benefits
  - Save 600 lives and prevent 900 new cases of silicosis per year
  - Projected net benefits of $7.7 billion annually
What are Silica Hazards?

Pre-drill review

- Quartz is the most common form of crystalline silica
- Crystalline silica can become respirable size particles from worker activities such as:
  - Chipping
  - Cutting
  - Drilling
  - Grinding

- Diseases associated with respirable crystalline silica:
  - Lung cancer
  - Silicosis
  - Chronic obstructive pulmonary disease
  - Kidney disease

- Silicosis: Scar tissue forms in the lungs (no cure)
  - Chronic/classic silicosis: Occurs after 15-20 years of moderate to low exposure
  - Accelerated silicosis: Occurs after 5-10 years of high exposure
  - Acute silicosis: Occurs after a few months to two years of extremely high exposure

- Two million construction workers exposed to respirable crystalline silica

- The standard is predicted to save 600 lives and prevent 900 new cases of silicosis per year
Types of Control Methods

Hazard identification

• Hazards must be identified in order to mitigate or control those hazards properly.

• It is important to:
  – Collect and review information
  – Inspect and observe activities at the jobsite
  – Involve workers by talking to and listening to their feedback
  – Investigate incidents of potential exposures
  – Stay tuned into information concerning silica and related hazards available from OSHA
Types of Control Methods

Worksite analysis

• Helps an employer determine what jobs and work stations are the sources of potential problems
• Generally conducted by a “qualified person”
  – Measures and identifies exposures, problem tasks, and risks
  – Inspects, researches, or analyzes potential health hazards
  – Recommends appropriate corrective action if a hazardous situation is identified
Types of Control Methods

General methods of control

• Depending on your task, dust exposures may be reduced in multiple ways
  – Dust suppression (wet methods, surfactants, etc.)
  – Vacuum dust collection (VDC)
  – Respiratory protection
  – Ventilated booths
  – Operator isolation
  – Fans (supplement only)
Types of Control Methods

Wet dust suppression

- Water sprays to wet material to generate less dust
  - Often the easiest and most effective dust control measure
  - Harder for wet dust to become airborne
  - Water applied in different ways to suit situation
  - Construction employees can use a variety of equipment (portable garden sprayer, fire hose)
Types of Control Methods

Wet methods: freezing temperatures

• Freezing temperatures complicate the use of water
  – Consider heating the local work area
  – Drain systems that are not in use
  – Chip away ice and sand to control slipping
Types of Control Methods

Wet methods: electrical safety

• Electrical safety is very important in wet areas
  – Ground-fault circuit interrupters (GFCIs)
  – Watertight, sealable electrical connectors
  – Assured equipment grounding conductor program
Types of Control Methods

Dust collection systems

• A vacuum dust collection system (VDC):
  – Pulls dust away from source
  – Includes dust collector, vacuum, vacuum hose, filter(s)

• Ensure system is clean and free of leaks or cracks

**TIP:** It’s a good idea to choose a vacuum equipped with a back-pulse filter cleaning cycle. Such auto-cleaning mechanisms will reduce the time required for vacuum maintenance and improve overall efficiency. If the vacuum does not have an auto-cleaning mechanism, the employee can periodically turn the vacuum cleaner on and off, which allows the bag to collapse and causes the pre-filter cake to dislodge from the filter. Contact the tools equipment manufacturer for vacuum options or related modifications that may be applicable to the specific tool in use.
Types of Control Methods

VDC system selection

- Dust collector: use appropriate size, follow manufacturer’s instructions
- Vacuum: appropriate power capacity for the job
- Vacuum hose: airflow resistance increases as diameter shrinks and length increases
- Filter(s): double filtration is crucial; use a high-efficiency particulate air (HEPA) filter

**TIP:** Review manufacturers’ operating specifications and recommendations for your equipment.
Types of Control Methods

Respiratory protection

• Respirators are required if dust control measures are otherwise insufficient
• Factors affecting respiratory protection systems:
  – Enclosed versus open spaces
  – # of operations generating silica dust
  – Environmental conditions, such as wind direction and speed
  – Percentage of silica found in materials

TIP: Employees working near operations where silica dust is generated may need respiratory protection even if they themselves are not performing a task that exposes them to respirable crystalline silica.
Types of Control Methods

Respiratory protection program

• When respirators are required, employer must have written respiratory protection program, which includes:
  – Selection and use of respirators
  – Medical evaluations and fit testing
  – Maintenance and cleaning
  – Required training
Types of Control Methods

Respiratory fit test

• Fit testing is done to be sure that the respirator’s facepiece fits the face. You should know:
• Respirators must be fit tested before you use them for the first time
• Fit tests must be performed at least every 12 months to be sure that the respirator continues to fit the face
Types of Control Methods

Fans

- Do not use fans as your sole method of dust control.
- Fans may **supplement** other control methods:
  - Useful in enclosed spaces
  - The bigger, the better
  - Best when set in an open window or external doorway with a second open window or door across the room

**TIP**: The use of compressed air to clean surfaces or clothing is strongly discouraged. Using compressed air to clean work surfaces or clothing can significantly increase employee exposure, especially in enclosed and semi-enclosed spaces. Cleaning should be performed with a HEPA-filtered vacuum or by wet methods.
Types of Control Methods

Hazardous equipment and operations

• Equipment and operations that may expose workers:
  – Stationary and handheld masonry saws
  – Hand-operated grinders
  – Tuckpointing/mortar removal
  – Jackhammers, rotary hammers and similar tools
  – Vehicle-mounted rock drilling rigs
  – Drywall finishing
  – General housekeeping operations

**TIP:** If you choose to modify equipment, it is important to follow equipment manufacturers’ recommendations in order to ensure that modifications do not adversely affect equipment performance and that no additional hazards are created.
Types of Control Methods

Pre-drill review

- Dust exposures control methods
  - Dust suppression (wet methods, surfactants, etc.)
  - Vacuum dust collection (VDC)
  - Respiratory protection
  - Ventilated booths
  - Operator isolation
  - Fans (supplement only)
- Wet methods
  - Often the easiest and most effective control method for dust control
  - Concerns include freezing conditions and risk of electrocution

- VCD = vacuum dust collection system
  - For maximum dust control, choose a vacuum hose that will permit the proper air flow rate, and use HEPA filters
- APF 10 and 25 are the respirators described the respirable crystalline silica standard
- Fans can supplement other control methods
  - Best when set in an open window or external doorway with a second open window or door across the room
<table>
<thead>
<tr>
<th>Table 1 Control Methods (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 1 of the respirable crystalline silica standard</td>
</tr>
<tr>
<td>• Provides the following information:</td>
</tr>
<tr>
<td>– Engineering and work practices controls for various common construction activities</td>
</tr>
<tr>
<td>– Required respiratory protection and minimum assigned protection factors (or APF)</td>
</tr>
<tr>
<td>• A work practice control seen throughout Table 1</td>
</tr>
<tr>
<td>– “Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions”</td>
</tr>
</tbody>
</table>
Table 1 Control Methods (1)

Stationary masonry saws

- Use saw with integrated water delivery system that continuously feeds water to the blade
- Don’t forget: Follow manufacturer’s instructions
• Handheld power saws (any blade diameter)
• Use saw with integrated water delivery system.
  – Respirator when used outdoors
  – Respirator when used indoors or in an enclosed area

<table>
<thead>
<tr>
<th>RESPIRATOR REQUIRED</th>
<th>≤ 4 hours /shift</th>
<th>&gt; 4 hours /shift</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outdoor: None</td>
<td>Outdoor: APF 10</td>
<td></td>
</tr>
<tr>
<td>Indoor: APF 10</td>
<td>Indoor: APF 10</td>
<td></td>
</tr>
</tbody>
</table>
Handheld power saws (blade diameter ≤ 8 inches)

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

For tasks performed outdoors only:
- Use saw with commercially available dust collection system
- Dust collector
  - Must provide the air flow recommended by the tool manufacturer, or greater
  - Have a filter with 99% or greater efficiency
Table 1 Control Methods (1)

- Walk-behind saws
- Use saw with integrated water delivery system
- The respirator requirements are slightly different from handheld power saws
  - Respirator only required for indoor use of walk-behind saw

<table>
<thead>
<tr>
<th>RESPIRATOR REQUIRED</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 4 hours /shift</td>
</tr>
<tr>
<td>Indoor: APF 10</td>
</tr>
</tbody>
</table>
Table 1 Control Methods (1)

Drivable saws

• For tasks performed outdoors only:
  – Use saw equipped with integrated water delivery system that continuously feeds water to the blade

**TIP:** Like all equipment identified in this training, it is important to operate and maintain tool in accordance with manufacturer's instructions to promote safety and health and to minimize dust emissions where applicable.
Rig-mounted core saws or drills

- Use tool equipped with integrated water delivery system that supplies water to cutting surface
Table 1 Control Methods (1)

Handheld and stand-mounted drills

Including impact and rotary hammer drills

• Use drill equipped with commercially available shroud or cowling with dust collection system

• Dust collector must:
  – Provide the air flow recommended by the tool manufacturer or greater, AND
  – Have a filter with 99% or greater efficiency, AND
  – Have a filter-cleaning mechanism

• Use a HEPA-filtered vacuum when cleaning holes
Dowel drilling rigs for concrete

For tasks performed outdoors only:

- Use shroud around drill bit with a dust collection system
- Dust collector must have a filter with 99% or greater efficiency and a filter-cleaning mechanism
- Use a HEPA-filtered vacuum when cleaning holes

<table>
<thead>
<tr>
<th>RESPIRATOR REQUIRED</th>
<th>≤ 4 hours /shift</th>
<th>&gt; 4 hours /shift</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outdoor: APF 10</td>
<td>Outdoor: APF 10</td>
<td></td>
</tr>
</tbody>
</table>
Table 1 Control Methods (1)

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, OR

• Operate from within an enclosed cab and use water for dust suppression on drill bit
Table 1 Control Methods (1)

- 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
  - Respirator when used outdoors
  - Respirator when used indoors or in an enclosed area

<table>
<thead>
<tr>
<th></th>
<th>≤ 4 hours /shift</th>
<th>&gt; 4 hours /shift</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outdoor: None</td>
<td>Indoor: APF 10</td>
<td>Outdoor: APF 10</td>
</tr>
<tr>
<td>Indoor: APF 10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 1 Control Methods (1)

Jackhammers and handheld powered chipping tools (2)

Alternative control method

- Use tool equipped with commercially available shroud and dust collection system
- Same dust collector requirements as mentioned earlier

<table>
<thead>
<tr>
<th></th>
<th>≤ 4 hours /shift</th>
<th>&gt; 4 hours /shift</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outdoor: None</td>
<td>Outdoor: APF 10</td>
<td></td>
</tr>
<tr>
<td>Indoor: APF 10</td>
<td>Indoor: APF 10</td>
<td></td>
</tr>
</tbody>
</table>

RESPIRATOR REQUIRED
Table 1 Control Methods (1)

Pre-drill review

• Wet method:
  – Stationary masonry saws
  – Handheld power saws (any blade diameter)
  – Walk-behind saws
  – Drivable saws for outdoor tasks
  – Rig-mounted core saws or drills
  – Vehicle-mounted drilling rigs for rock and concrete
  – Jackhammers and handheld powered chipping tools

• Dust collection method:
  – Handheld power saws for cutting fiber-cement board (with blade diameter of 8 inches or less)
  – Handheld and stand-mounted drills
  – Dowel drilling rigs for concrete in outdoor tasks
  – Vehicle-mounted drilling rigs for rock and concrete
  – Jackhammers and handheld powered chipping tools

• Wet or dust collection method:
  – Vehicle-mounted drilling rigs for rock and concrete
  – Jackhammers and handheld powered chipping tools

• Activities with respirator requirements:
  – Handheld power saws (any blade diameter),
  – Walk-behind saws
  – Dowel drilling rigs for concrete
  – Jackhammers and handheld powered chipping tools

• An important work practice control:
  – Operate and maintain the tools in accordance with the manufacturer’s instructions to minimize dust emissions
Handheld grinders for mortar removal

“Tuckpointing”
• Use grinder equipped with commercially available shroud and dust collection system
• 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
  – Have a cyclonic pre-separator or filter-cleaning mechanism

RESPIRATOR REQUIRED

<table>
<thead>
<tr>
<th>≤ 4 hours /shift</th>
<th>&gt; 4 hours /shift</th>
</tr>
</thead>
<tbody>
<tr>
<td>APF 10</td>
<td>APF 25</td>
</tr>
</tbody>
</table>
Handheld grinders for uses other than mortar removal

For tasks performed outdoors only:

- Use grinder equipped with integrated water delivery system that continuously feeds water to the grinding surface
Handheld grinders for uses other than mortar removal (2)

**Alternative control method**

- Use grinder equipped with commercially available shroud and dust collection system
- Dust collector
  - Same specs as the previously mentioned dust collector for use in mortal removal
  - Respirator when used indoors or in an enclosed area

<table>
<thead>
<tr>
<th>≤ 4 hours /shift</th>
<th>&gt; 4 hours /shift</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indoor: None</td>
<td>Indoor: APF 10</td>
</tr>
</tbody>
</table>
Walk-behind milling machines and floor grinders

• Use machine equipped with integrated water delivery system that continuously feeds water to the cutting surface, OR
• Use machine equipped with dust collection system recommended by the manufacturer
• Same dust collector specs as for mortar removal:
  – Must provide the air flow recommended by the manufacturer or greater, AND
  – Have a filter with 99% or greater efficiency, AND
  – Have a filter-cleaning mechanism
• Use a HEPA-filtered vacuum when indoors
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

**TIP:** A surfactant is a substance added to a liquid which can alter its spreading or wetting characteristics by lowering its surface tension. Surfactants help bind the water spray to the dust particles in air.
Large drivable milling machines (half-lane and larger)

**For cuts of any depth on asphalt only OR 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
Table 1 Control Methods (2)

Large drivable milling machines (half-lane and larger) (2)

**Alternative control method**

- Use a machine equipped with supplemental water spray designed to suppress dust
  - Water must be combined with a surfactant
Crushing machines

• Use equipment designed to deliver water spray or mist for dust suppression at crusher and other points where dust is generated, such as:
  – Hoppers
  – Conveyers
  – Sieves for sizing or vibrating components
  – Discharge points

• Also, use either of these:
  – Ventilated booth that provides fresh, climate-controlled air to the operator, OR
  – Remote control station
For abrading or fracturing silica-containing materials OR for conducting demolition tasks involving such materials:

• Operate equipment from within an enclosed cab
• For employees outside of the cab who are engaged in the task, apply water and/or dust suppressants as necessary to minimize dust emissions
Table 1 Control Methods (2)

Heavy equipment and utility vehicles (2)

For tasks such as grading and excavating:

• Apply water and/or dust suppressants as necessary to minimize dust emissions, OR

• When the equipment operator is the only employee engaged in the task, operate equipment from within an enclosed cab
Pre-drill review

- Wet method:
  - Handheld grinders for uses other than mortar removal (outdoors)
  - Walk-behind milling machines and floor grinders
  - Small drivable milling machines (less than half-lane)
  - Large drivable milling machines (half-lane and larger)
  - Crushing machines
  - Heavy equipment and utility vehicles
- Dust collection method:
  - Handheld grinders for uses other than mortar removal
  - Walk-behind milling machines and floor grinders

- Wet or dust collection method:
  - Handheld grinders when operated for uses other than mortar removal
  - Walk-behind milling machines and floor grinders
  - Some activities, especially for large machines, have additional requirements beyond wet and dust collection controls
  - Activities with respirator requirements:
    - Handheld grinders for mortar removal (tuckpointing)
    - Handheld grinders for uses other than mortar removal
  - Again, here is an important work practice control:
    - Operate and maintain the tools in accordance with the manufacturer’s instructions to minimize dust emissions
Employer Responsibilities

Employer responsibilities under the standard

• Employer responsibilities under 29 CFR 1926.1153
  – Engineering and work practices controls
    • Table 1
    • Alternative exposure control methods
  – Respiratory protection
  – Housekeeping
  – Written exposure control plan
  – Medical surveillance
  – Communication of respirable crystalline silica hazards to employees
  – Recordkeeping
Employer Responsibilities

Implementing Table 1 control measures

• For tasks performed indoors or in enclosed areas:
  – Provide a means of exhaust as needed to minimize the accumulation of visible airborne dust
• For tasks performed using wet methods:
  – Apply water at flow rates sufficient to minimize release of visible dust
• For measures implemented that include an enclosed cab or booth:
  – Ensure that it meets OSHA’s specifications as listed in the respirable crystalline silica standard

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

Working on multiple at-risk activities

• When added up, if the total duration of those tasks is going to be:
  – Greater than four hours: use the respirator that is required for > 4 hours per shift, as seen in Table 1
  – Less than four hours: use the respirator that is required for ≤ 4 hours per shift, as seen in Table 1

**TIP:** Don’t forget to follow the manufacturer’s instructions on how to use your work equipment so that you protect yourself from respirable crystalline silica.
Employer Responsibilities

Alternative exposure control methods

• For tasks not listed in Table 1 or not feasible as described in Table 1:
  – Permissible exposure limit (PEL)
  – Exposure assessment
  – Methods of compliance

**TIP:** The following is an excerpt from 29 CFR 1926.1153 regarding Table 1 and the alternative exposure control methods found in Paragraph D:

Specified exposure control methods. (1) For each employee engaged in a task identified on Table 1, the employer shall fully and properly implement the engineering controls, work practices, and respiratory protection specified for the task on Table 1, unless the employer assesses and limits the exposure of the employee to respirable crystalline silica in accordance with paragraph (d) of this section [which is the Alternative Exposure Control Methods paragraph].
Permissible exposure limit (PEL)

• Ensure that no employee is exposed to an airborne concentration of respirable crystalline silica in excess of 50 μg/m³, calculated as an 8-hour time-weighted average (TWA)
Employer Responsibilities

Exposure assessment

• Assessment of worker exposure in accordance with specifications around:
  – Performance-based or scheduled monitoring assessments
  – Reassessment requirements
  – Sample analysis methods
  – Employee notification of assessment results, with affected workers notified in writing within five business days from the date of assessment
  – Employee observation of monitoring
Employer Responsibilities

Methods of compliance

• Engineering and work practice controls
  – Must be used to reduce and maintain employee exposure to less than the PEL
  – If engineering and work practice controls are insufficient, they still must be used and supplemented by respiratory protection

• Abrasive blasting
  – A special concern
  – Requires compliance with other OSHA standards, as well

**TIP:** Unlike the exposures encountered in construction work, in general industry (such as manufacturing and warehouse work), the most severe exposures to crystalline silica result from abrasive blasting. OSHA has created separate standards for construction and for general industry based on the respirable crystalline silica rule.
Respiratory protection

- Respiratory protection compliance
  - Requirements seen in Table 1 of the respirable crystalline silica standard
  - Standard 29 CFR 1910.134 regarding respiratory protection and programs
Housekeeping

• Where such activity could contribute to employee exposure to respirable crystalline silica:
  – No dry sweeping or dry brushing
  – No using compressed air to clean clothing or surfaces unless:
    • Used in conjunction with a ventilation system that effectively captures the dust cloud, OR
    • No alternative method is feasible
Employer Responsibilities

Written exposure control plan

• Elements of the written exposure control plan
  – Tasks that involve exposure to respirable crystalline silica
  – Engineering controls, work practices, and respiratory protection
  – Housekeeping measures
  – Procedures used to restrict access to work areas
• Review, evaluate, and (as needed) update the plan annually
• Make the plan readily available to employees and others
• Designate a competent person to make inspections and implement the plan
Employer Responsibilities

Medical surveillance

• **At no cost** for each employee who will be required by the respirable crystalline silica standard to use a respirator for **30 or more days per year**

• Performed by a “physician or other licensed health care professional” (PLHCP)

**TIP:** OSHA’s respiratory protection standard requires an initial medical evaluation to determine the employee's ability to use a respirator before the employee is fit tested or required to use the respirator in the workplace. At a minimum the employer must provide additional evaluations if an employee shows signs or symptoms that are related to their ability to wear a respirator. There is not a specific annual requirement for medical evaluations in the standard. However, the physician or other licensed healthcare provider (PLHCP) may prescribe annual tests to ensure employees' continued ability to wear a respirator.
Employer Responsibilities

• Medical surveillance: initial examination
  • Initial medical exam within 30 days after initial assignment, unless employee had compliant medical exam within the last three years
  • The examination must consist of:
    – A medical and work history
    – A physical examination with special emphasis on the respiratory system
    – A chest X-ray
    – A pulmonary function test
    – Testing for latent tuberculosis infection
    – Any other tests deemed appropriate by the PLHCP
Medical surveillance: periodic examinations

- Periodic medical exams:
  - Consisting of all examination items in the initial exam, except testing for latent tuberculosis infection
  - At least every three years, OR
  - More frequently if recommended by the PLHCP
Medical surveillance: Information and additional exams

• The employer must also:
  – Provide information to the PLHCP
  – Ensure that the PLHCP explains the medical exam results to the employee and provides employee with a medical report within 30 days of the exam
  – Obtain from the PLHCP a medical opinion within 30 days of the exam
  – Grant a medical exam by a specialist within 30 days after receiving the PLHCP’s written opinion that a specialist exam is required, and then obtain from the specialist a medical opinion within 30 days of the specialist’s exam

**TIP:** As a reminder, PLHCP stands for “physician or other licensed health care professional.”
Communication of hazards to employees

**Hazard communication**

- Include respirable crystalline silica in the communication program complying with the hazard communication standard (HCS) 29 CFR 1910.1200
- Need to address the following hazards:
  - Cancer
  - Lung effects
  - Immune system effects
  - Kidney effects
Employer Responsibilities

Communication of hazards to employees (2)

Employee information and training

• Ensure that each employee covered by the respirable crystalline silica standard can demonstrate knowledge and understanding of at least the following:
  – Health hazards related to respirable crystalline silica
  – Work tasks at risk of exposure
  – Specific measures to protect employees
  – Contents of the respirable crystalline silica standard
  – Identity of the designated competent person
  – Medical surveillance program

• Make a copy of the respirable crystalline silica standard readily available without cost to each employee covered by this standard
Recordkeeping

• Make and maintain an accurate record of:
  — Air monitoring data
  — Objective data
  — Medical surveillance records

• Ensure that medical records are maintained and made available in accordance with OSHA standard 29 CFR 1910.1020 (Access to employee exposure and medical records)
Employer Responsibilities

Pre-drill review

• Implementing engineering and work practices controls
  – If multiple at-risk tasks in a shift, add up the hours to determine the respirator requirements
  – Criteria for alternative controls:
    • Permissible exposure limit (PEL)
    • Exposure assessment
    • Methods of compliance
• Respiratory protection
  – In accordance with this standard and the respiratory protection standard
• Housekeeping
  – No dry sweeping or dry brushing
  – No using compressed air to clean clothing or surfaces (except under certain conditions)
• Written exposure control plan
  • Review and evaluate the plan annually
• Medical surveillance
  • Free medical exams for employees required to wear respirator for 30+ days per year
  • Periodic exams at least every three years
  • Performed by PLHCP, with reports and opinions delivered within 30 days after the exam
• Communication of respirable crystalline silica hazards to employees
  • In accordance with this standard and the standard on hazard communication
• Recordkeeping
  • In accordance with this standard and the standard on access to employee exposure and medical records
Conclusion

Summary

• You should now be able to:
  – Explain what respirable crystalline silica is and the health hazards associated with it
  – Identify the construction activities and equipment commonly linked to respirable crystalline silica
  – List the control measures and respiratory protection required under OSHA’s standard on respirable crystalline silica
  – Recognize employer responsibilities and employee rights under OSHA’s standard on respirable crystalline silica
Conclusion

- OSHA’s On-site Consultation Program
- Free and confidential
- For small and medium-sized businesses
- Consultation is different from enforcement
  - No penalties or citations involved
- call 1-800-321-OSHA (6742) or visit www.osha.gov/dcsp/smallbusiness
Conclusion

References

• OSHA’s Respirable Crystalline Silica Standard 29 CFR 1926.1153
• OSHA’s Fact Sheet on the Respirable Crystalline Silica Standard
• The link to OSHA’s webpage for the respirable crystalline silica standard, which includes multiple other related links