

Respirable Crystalline Silica in Construction #16-077

I. Introduction

Workplace illness takes the lives of thousands of workers each year. Respirable crystalline silica is a very dangerous hazardous mineral to which many workers are exposed. Approximately 2.3 million workers are exposed to crystalline silica and OSHA estimates about 40% of these workers are exposed to silica levels which exceed the current permissible exposure levels. OSHA sets and enforces standards which provide protection to the nations workers. This training program will look at key points of the OSHA standard regarding respirable crystalline silica and help you protect yourself from the hazards associated with it.

II. OSHA Standards

OSHA finalized two silica standards to protect workers from the serious risks posed by silica exposure. One standard is for general industry and one is for the construction industry. This training program is designed to assist employers and employees in understanding the dangers of crystalline silica and the requirements for meeting the OSHA regulations. OSHA estimates the standards will save over 600 lives annually and prevent more than 900 cases of silicosis each year

III. Crystalline Silica

- A. Crystalline silica is a common industrial mineral found in many naturally occurring materials and used in many industrial products and at construction sites. Quartz, the most common form of silica, is a component of sand, concrete, stone, rock, brick and mortar. Crystalline silica is also used to make products such as glass, pottery, ceramics, bricks, concrete and artificial stone.
- B. Occupational exposure to respirable crystalline silica occurs when cutting, sawing, drilling, and crushing of concrete, brick, ceramic tiles, rock, and stone products. Occupational exposure also occurs in operations that process or use large quantities of sand, such as foundries and the glass, pottery and concrete products industries.
- C. Workers who inhale very small crystalline silica particles are at increased risk of developing serious, often fatal, silica-related diseases. There is strong scientific evidence showing exposure to respirable crystalline silica can increase the risk for:
 - i. Developing lung cancer
 - ii. Developing silicosis, an incurable and sometimes deadly, lung disease; and
 - iii. Developing other potentially debilitating respiratory diseases such as chronic obstructive pulmonary disease and kidney disease.

IV. Exposure Control Plan

- A. A written exposure control plan must be implemented. Some of the required elements of the plan are:
 - i. A description of the tasks in the workplace that involve exposure to respirable crystalline silica;
 - ii. A description of the engineering controls, work practices, and respiratory protection used to limit employee exposure to respirable crystalline silica for each task;

- iii. A description of the housekeeping measures used to limit employee exposure to respirable crystalline silica; and
 - iv. A description of the procedures used to restrict access to work areas when necessary.
- B. The exposure control plan must be reviewed and evaluated at least annually and updated as necessary.
 - C. The written exposure control plan must be readily available for examination and copying, upon request, to each employee.
 - D. A competent person must be designated to make frequent and regular inspections of job sites, materials, and equipment to implement the written exposure control plan. The competent person will be capable of identifying existing and foreseeable respirable crystalline silica hazards in the workplace and will have authorization to take prompt corrective measures to eliminate or minimize them.

V. Exposure Assessment and Compliance

Engineering controls and work practices are the primary methods to keep exposures at or below the PEL. The standard provides flexible alternatives to protect workers. Employers can use a control method described in Table 1 in the OSHA construction industry regulation CFR 1926.1153 or they can measure workers' exposure to silica and independently decide which dust controls work best to limit exposure to the PEL in the workplace.

A. Table 1

- i. Table 1 is a flexible compliance option which effectively protects workers from exposure. OSHA identified 18 common construction tasks which generate high exposure to respirable crystalline silica and determined specific engineering controls, work practices and respiratory protection for each task. These common tasks are listed in Table 1 of the construction industry regulation. Proper implementation of these controls:
 - a) Provide adequate protection for employees; and
 - b) Negates the need to measure worker's exposure to silica to verify levels are at or below the PEL.
- ii. When implementing the control measures in Table 1, the following guidelines must be followed:
 - a) A means of exhaust must be provided for tasks performed indoors or in enclosed areas to minimize accumulation of visible airborne dust.
 - b) Flow rates of water must be sufficient for tasks using wet methods to minimize release of visible dust.
 - c) Measures which include an enclosed cab or booth must ensure the cab or booth:
 - Is maintained as free as practicable from settled dust;
 - Has door seals and closing mechanisms which work properly;
 - Has gaskets and seals which are in good condition and working properly;
 - Is under positive pressure maintained through continuous delivery of fresh air;
 - Has intake air which is filtered through a filter that is 95% efficient in the 0.3-10.0 μm range; and

- Has heating and cooling capabilities
- iii. If a worker performs more than one task on Table 1 during the course of a shift, and the total duration of all tasks combined is more than four hours, the required respiratory protection for each task is the respiratory protection specified for more than four hours per shift. If the total duration of all tasks on Table 1 combined is less than four hours, the required respiratory protection for each task is the respiratory protection specified for less than four hours per shift.

B. Alternative Exposure Control Methods

- i. For tasks not listed on Table 1 or when Table 1 is not fully and properly implemented, employees must not be exposed to an airborne concentration of respirable crystalline silica in excess of the PEL. The following steps must be taken:
 - a) The amount of silica workers are exposed to must be measured if it may be at or above an action level of 25 micrograms of silica per cubic meter of air averaged over an eight-hour day.
 - b) Workers must be protected from respirable crystalline silica exposure above the PEL of 50 micrograms of silica per cubic meter of air averaged over an eight-hour day.
- ii. Methods of compliance
 - a) Engineering and work practice controls must be used to reduce and maintain employee exposure to respirable crystalline silica at or below the PEL.
 - Example of engineering control: wetting down work operations or using local exhaust ventilation to keep silica dust out of the air.
 - Example of work practice control: wetting down dust before sweeping it up or using the water flow rate recommended for a tool with water controls.
 - b) When such controls are not sufficient to reduce exposure at or below the PEL, they should be used to reduce worker exposure to the lowest feasible level and supplement the controls with the use of respiratory protection. Respirators are only allowed when engineering and work practice controls cannot maintain exposures at or below the PEL.

VI. Respiratory Protection

- A. If a respirator is required, employers must institute a respiratory protection program in accordance with OSHA regulation 29 CFR 1910.134.
- B. Respirators are not as protective as engineering and work practice controls and aren't always practical in many instances. Unless all of the following steps are taken, workers will still be exposed to silica. Respirators must be:
 - i. Selected for each worker;
 - ii. Individually fitted and periodically refitted;
 - iii. Regularly maintained and filters and other parts replaced as necessary; and
 - iv. Worn consistently and correctly by the employee.
- C. Respiratory protection is required:
 - i. Where exposures exceed the PEL during periods necessary to install or implement feasible engineering and work practice controls;

- ii. Where exposures exceed the PEL during tasks, such as certain maintenance and repair tasks, for which engineering and work practice controls are not feasible; and
- iii. During tasks for which an employer has implemented all feasible engineering and work practice controls and such controls are not sufficient to reduce exposures at or below the PEL.

VII. Housekeeping

- A. Dry sweeping or dry brushing is not allowed if such activity could contribute to employee exposure unless wet sweeping, HEPA-filtered vacuuming or other methods which minimize the likelihood of exposure are not feasible
- B. Compressed air cannot be used to clean clothing or surfaces where such activity could contribute to employee exposure unless:
 - The compressed air is used in conjunction with a ventilation system that effectively captures the dust cloud created by the compressed air; or
 - No alternative method is feasible.

VIII. Medical Surveillance

- In some situations OSHA requires employers to provide free medical surveillance by a physician or other licensed health care professional (PLHCP) for employees. The purpose of medical surveillance is to:
- Identify adverse health effects associated with respirable crystalline silica exposure to ensure appropriate actions can be taken;
 - Determine if an employee has any condition, such as lung disease, which might make him or her more sensitive to respirable crystalline silica exposure; and
 - Determine the employee's fitness to use respirators.
- A. An initial baseline medical examination is required. The initial medical exam should consist of:
 - i. A medical and work history;
 - ii. A physical examination with special emphasis on the respiratory system;
 - iii. A chest x-ray;
 - iv. A pulmonary function test;
 - v. Testing for latent tuberculosis (TB) infection; and
 - vi. Any other tests deemed appropriate by the PLHCP.
 - B. A periodic medical exam is required at least every three years, or more frequently if recommended by the PLHCP. The periodic medical examinations are the same as the initial examination except testing for latent tuberculosis infection is not required.
 - C. Results of the medical surveillance are given to the employee and not the employer. Employers do not need medical findings because they should base employee protections on exposure levels and how well controls are working. Employees need the results of medical examinations to manage their health.
 - D. With the information gained from medical surveillance, workers can take actions to improve their health, such as making job choices to reduce exposure, wearing a respirator for extra protection, or making personal lifestyle or health decisions, such as quitting smoking or getting flu shots.

IX. Training

OSHA's employee training requirements for respirable crystalline silica are more performance-based. Training is performance-oriented in order to allow flexibility for employers to provide training as needed, to ensure each employee can demonstrate the knowledge and understanding required under the rule. Employers must ensure covered employees can demonstrate knowledge and understanding of at least the following:

- The health hazards associated with exposure to respirable crystalline silica;
- Specific tasks in the workplace that could result in exposure to respirable crystalline silica;
- Specific measures the employer has implemented to protect employees from exposure to respirable crystalline silica, including engineering controls, work practices, and respirators to be used;
- The purpose and a description of the medical surveillance program; and

Construction industry employees must also be able to identify the competent person designated by the employer.

X. Conclusion