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# T N E M E T E C H



## SUBJECT

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Respirable Crystalline Silica

## PURPOSE

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To provide industry guidelines concerning changes to regulatory silica exposure limits in construction and to provide best practice examples of acceptable exposure control methods.

## GENERAL

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Crystalline silica is a basic ingredient of soil, sand, granite, and many other minerals. The three most common types, quartz, cristobalite, and tridymite, are capable of forming respirable particles (particles that are less than 10  $\mu\text{m}$  and at least 100 times smaller than ordinary sand) as a result of operations involving grinding, chipping, blasting, drilling or mixing substances or objects that contain crystalline silica. Over time, respirable crystalline silica and other respirable particles can contribute to harmful health effects to those exposed.

### Hazards

OSHA estimates 2.3 million U.S. workers are exposed to Respirable Silica. In excessive levels, these exposures place workers at an elevated risk of developing serious health problems, including kidney disease, lung cancer, chronic obstructive pulmonary disease (COPD), and silicosis. Many Tnemec coatings contain forms of silica. Respirable silica in Tnemec coatings is not a concern in “wet” or cured paint; the potential harmful effects exist only in particle or aggregate form that is airborne. End users of Tnemec coatings may be exposed to respirable crystalline silica while mixing single and multi-component products that utilize silica containing aggregate. Examples of these Tnemec products include Series 130, 211, 217, N218, N241, N242, N243, N244, N246, and G434.

Other harmful exposures may occur during removal of silica-containing Tnemec coatings when abrasive blasting, scraping, or sanding cured product. Blasting not only removes coatings, but can also potentially release respirable particles from concrete or mineral substrates. Research has shown respirable particulates other than silica have the potential to cause harm after repeated exposures. These substances include asbestos, silicates, various mineral compounds and heavy metals, and generic nuisance dusts. These exposures, along with jobsite condition and operations, should also be considered when developing a comprehensive sight-specific job hazard analysis and exposure control plan.

### Requirements

As of September 23, 2017, the Occupational Safety and Health Administration (OSHA) is enforcing a revised Respirable Crystalline Silica Standard (29 CFR 1926.1153). Key provisions in the regulation involve dropping the Permissible Exposure Limit (PEL) of respirable crystalline silica at which an employee can be exposed from 250 micrograms per cubic meter of air ( $\mu\text{g}/\text{m}^3$ ) during an 8-hour Time Weighted Average (TWA) to a new PEL of 50  $\mu\text{g}/\text{m}^3$ . Respiratory protection becomes mandatory at the 50  $\mu\text{g}/\text{m}^3$  level and any workers exposed to this threshold for greater than 30 days in one calendar year are required to participate in

medical exams involving chest X-rays and lung function tests every three years. Construction employers are also required to conform to specific exposure control methods outlined in Table 1 of the regulation or develop alternative exposure control methods and demonstrate worker exposure levels are below the Action Level of 25 ug/m<sup>3</sup>. If levels are over 25 ug/m<sup>3</sup>, the Employer must designate a Competent Person to establish and implement a written exposure plan listing tasks that expose workers to silica and how to control exposures, and train workers on silica exposure hazards and means to control dusts.

### Methods of Exposure Control

As required by law, employers must designate a Competent Person to perform a comprehensive hazard assessment for all jobsite processes that are believed to create respirable crystalline silica exposures to workers in excess of 25 ug/m<sup>3</sup> PRIOR to beginning work. Emphasis should be placed on operations involving mixing of silica containing aggregates and any mechanical operations that create silica dust. Once these operations have been identified, an exposure control plan must be implemented to protect workers from any potentially harmful exposures.

OSHA has published Table 1 of their Respirable Silica Standard to assist Employers in reducing respirable silica exposures to acceptable levels. Table 1 can be found on the [OSHA website](#). The table identifies general construction equipment / tasks, their engineering and work practice control methods, and the required respiratory protection and minimum assigned protection factor (APF) for those tasks based on both less than or greater than a four-hour shift.

### Basic Guidelines

- Always mix materials outdoors or in well ventilated areas.
- Add dry respirable silica containing materials to liquid, not liquid to respirable silica containing dry materials.
- Pour dry respirable silica-containing materials as close to the solution in the mixing vessel as possible.
- Use lower speeds for mixers.
- Use engineering controls such as HEPA vacuums with dust containment systems; no dry sweeping.
- Perform air monitoring to determine worker exposure if Respirable Silica levels are unknown.
- Wash dust off skin.
- Avoid working in cotton or knitted clothing when exposed to Respirable Silica.
- Limit worker traffic to necessary individuals only in known areas of silica exposure.
- As an alternate to open sandblasting consider methods such as automated blasting, vacuum blasting, blast rooms and blast cabinets.
- Use blasting media other than sand when conditions allow. Suitable substitutes include crushed nut shells, fruit kernels, corn starch, high pressure water, sodium bicarbonate, dry ice, steel shot, steel grit, or plastic abrasive agents. Use of alternative blast media does not prevent silica exposure, as coatings and structural substrate compositions often contain silica or other materials that may become respirable as a result of abrasive blasting.

## Resources

Tnemec has published this resource bulletin to assist construction employers in their efforts to prevent harmful worker exposures to respirable crystalline silica and comply with existing regulations set forth by OSHA. The following are other available resources outlining regulations, related government funded assessments, and general respirable crystalline silica exposure:

- OSHA Final Silica Rule 2016-04800: [gpo.gov/fdsys/pkg/FR-2016-03-25/pdf/2016-04800.pdf](https://www.gpo.gov/fdsys/pkg/FR-2016-03-25/pdf/2016-04800.pdf)
- OSHA Standard §1926.1153, p 3: [osha.gov/silica/SilicaConstructionRegText.pdf](https://www.osha.gov/silica/SilicaConstructionRegText.pdf)
- OSHA Fact Sheet – OSHA’s Crystalline Silica Rule: [osha.gov/Publications/OSHA3681.pdf](https://www.osha.gov/Publications/OSHA3681.pdf)
- National Institute for Occupational Safety and Health on Silica and Worker Health: [cdc.gov/niosh/silica/about/index.html](https://www.cdc.gov/niosh/silica/about/index.html)
- OSHA Fact Sheet - Protecting Workers from the Hazards of Abrasive Blasting Materials: [osha.gov/Publications/OSHA3697.pdf](https://www.osha.gov/Publications/OSHA3697.pdf)
- OSHA Respirable Crystalline Silica webpage: [osha.gov/silica-crystalline](https://www.osha.gov/silica-crystalline)

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