



# CRYSTALLINE SILICA EXPOSURE CONTROL PRACTICE

<b>Document Reference</b>	RAMSPROZONE-CSECP-001
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<b>Classification</b>	CONTROLLED — HSE Department
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<b>Applicable Standards</b>	ISO 45001:2018   ISO 14001:2015   ISO 45003:2021   IEC 62133-2   RoHS 2011/65/EU   WEEE 2012/19/EU   REACH 1907/2006   SEMI S2   OSHA 29 CFR 1910
<b>Geographic Scope</b>	International — applicable at all electronics manufacturing facilities globally. Local regulatory supplements are required where national law is more stringent.

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## PURPOSE

This practice identifies the requirements for minimizing exposure to silica.

## SCOPE

This practice includes the following major sections:

- General Requirements
- Monitoring
- HSE Support to Line Management
- Training
- Work Practices

## APPLICATION

This practice applies to work activities and employees under the control of **RAMSPROZONE** and its contractors.

## DEFINITIONS

**Action Level (AL)** – Refers to an exposure one half the allowable limit (TLV-TWA).

**Respirable Fraction** – In an industrial hygiene (IH) sample, refers to those particles between 2 and 5 micrometers in diameter that are small enough to penetrate the nose and upper respiratory system and be deposited deep into the lungs. Particles that penetrate deeply into the respiratory system are generally beyond the ability of the body's natural clearance mechanisms of cilia and mucous and are more likely to be retained.

**Threshold Limit Value – Time-Weighted Average (TLV-TWA)** – The TWA concentration for a conventional 8-hour workday and a 40-hour workweek, to which it is believed that nearly all workers may be repeatedly exposed, day after day, without adverse effect.

**Threshold Limit Value – Short-Term Exposure Limit (TLV-STEL)** – The concentration to which it is believed that workers can be exposed continuously for a short period of time without suffering from irritation, chronic or irreversible tissue damage, or narcosis of sufficient degree to increase the likelihood of accidental injury, impair self-rescue, or materially reduce work efficiency, and provided that the daily TLV-TWA is not exceeded. A STEL is a 15-minute TWA exposure that should not be exceeded at any time during a workday even if the 8-hour TWA is within the TLV-TWA.

# GENERAL REQUIREMENTS

## 1.1 Potential Exposures

Work conducted in/around the following industries/activities may result in exposure to employees:

- Sandstorms (naturally occurring)
- Mining (cutting, blasting, or drilling through sandstone and granite)
- Foundry work (grinding, moldings, shakeout, core room)
- Ceramics, clay, and pottery
- Stone cutting (sawing, abrasive blasting, chipping, grinding)
- Glass manufacturing
- Dirt work or vehicular traffic on dirt roads
- Abrasive blasting
- Railroad (setting and laying track)
- Manufacturing and use of abrasives
- Manufacturing of soaps
- Demolition, removal, or salvage of structures where materials containing silica are present
- Hand- or machine-mixing materials to create concrete or grout
- Construction (sandblasting/rock drilling/masonry work/jack hammering/tunneling)
- New construction, alteration, repair, or renovation of structures and substrates containing silica

The industries/activities listed above are examples. The project HSE Representative will identify the areas or operations involving the disturbance of silica that are likely to generate visible amounts of silica. The identified areas or operations will be discussed as part of the new hire orientation, hazard communication, and, if required, silica exposure training courses for employees.

Additionally, activities conducted using silica/silica-containing products—or that result in visible airborne silica—will be identified on the Job Safety Analysis (JSA), Form **0000000**, or the Safety Task Analysis (STA), Form **0000000**, with controls established.

## 1.2 Properties and Effects

Silica occurs as a natural component of many materials in the construction and general industry. Crystalline silica is always present in substantial quantities in sand, sandstone, and granite. Exposure over a long period of time leads to fibrosis of the lung tissues with a subsequent loss of lung tissue — this is called silicosis. Employees affected by silicosis usually suffer from shortness of breath and find it difficult to walk short

distances on stairs. Silicosis is incurable. Crystalline silica is a recognized human carcinogen.

### Physical Data

Property	Value
Appearance	White powder
Odor	None
Odor Threshold	N/A
Explosive Limits	N/A
Melting Point	3110 °F (1710 °C)
Vapor Pressure	N/A
Vapor Density	N/A
Ignition Temperature	Nonflammable

### Acute

Effect	Description
Irritant	Mild
Sensitization	Unlikely
<b>Eye Effects</b>	Low concentration may cause irritation to the lining of the eye. Repeated exposure to low concentrations is reported to cause inflammation of the eye tissues, sensitivity to light, tearing, pain, and blurred vision.
<b>Skin Effects</b>	May irritate sensitive skin.

Effect	Description
<b>Ingestion Effects</b>	Ingestion is unlikely.
<b>Inhalation Effects</b>	An acute form of silicosis has occurred in a few workers exposed to very high concentrations of silica over periods of as little as a few weeks. History is one of progressive shortness of breath, fever, cough, and weight loss.

### Chronic

Health Effect	Status
Teratogen (may cause birth defects)	No
Reproductive Hazard	No
Mutagen (may cause damage to DNA)	No
Synergistic Effects (more toxic when mixed with other chemicals)	None reported
Carcinogenicity	NTP: Yes IARC: Yes OSHA: Yes
Medical Conditions Aggravated by Exposure	Respiratory and heart

Chronic silicosis, the most common form of the disease, may go undetected for years in the early stages; in fact, a chest X-ray may not reveal an abnormality until after 15 or 20 years of exposure. The body's ability to fight infections may be overwhelmed by silica dust in lungs, making workers more susceptible to certain illnesses such as tuberculosis. As silicosis progresses, one or more of the following symptoms may develop:

- Shortness of breath following physical exertion
- Severe cough
- Fatigue
- Loss of appetite
- Chest pains

- Fever

Inhalation of quartz is classified as a human carcinogen.

### First Aid

Exposure	Action
Skin/Eyes	Flush with clean, low-pressure water for 5–15 minutes.
Severe inhalation	Remove from contaminated area immediately. Give oxygen. If not breathing, give artificial respiration. <b>Do not attempt to rescue unless you wear self-contained breathing apparatus.</b>

## 1.3 Exposure Limits and Routes

### A. Action Level

0.015 mg/m<sup>3</sup> respirable fraction of crystalline silica.

### B. Exposure Limits

0.025 mg/m<sup>3</sup> respirable fraction of crystalline silica (ACGIH TLV).

### C. Routes of Entry

Route	Permitted?
Skin Contact	Yes
Skin Absorption	No
Eye Contact	Yes
Inhalation	Yes
Ingestion	Unlikely

## 1.4 Plans

Where exposure limits are likely to be exceeded, a "silica compliance plan" or a JSA must be developed. The plan will:

- Address the scope of work activities.
- Provide an initial exposure assessment.
- Prescribe exposure controls (such as water sprays, exhaust ventilation, working inside enclosures with filtered air supplies), air-monitoring requirements, work practices, dust control measures, personal protective equipment, and additional information/requirements as appropriate.

Results of air or bulk sampling, calculations of potential silica exposure, and other data that demonstrate compliance with this practice are attached to the plan/JSA.

## **MONITORING**

### **2.1 Request Past Sampling Results from Client**

Before working in operating facilities or areas with known sources of silica, each project will formally request information from the client on past IH, air quality, or other sample results that may be used to indicate the levels of exposure likely to be encountered by **RAMSPROZONE** and contractor employees. This request will be in writing and documented in accordance with the project's document control procedures. The written request and any response will become part of the project records and will be retained in accordance with Practice **0000000**, Records Management and Document Control.

### **2.2 Notification of Results**

Notification of monitoring results will be in accordance with Practice **0000000**, Hazard Communications.

### **2.3 Observation of Monitoring**

The monitoring process may be observed by employees whom the monitoring affects.

### **2.4 Industrial Hygiene Monitoring Methods**

The common IH monitoring methods for silica are NIOSH laboratory analysis methods (as appropriate) 7500, 7501, 7601, 7602, 7603 (<http://www.cdc.gov/niosh/nmam/pdfs/7500.pdf>)

## 2.6 Monitoring Results

Monitoring results will be sent to the Corporate IH Manager in accordance with the schedule in Practice **0000000**, Industrial Hygiene Program Requirements.

## HSE SUPPORT TO LINE MANAGEMENT

The HSE Representative, with support from the Corporate IH Manager, will perform the following:

- As part of the JSA and other hazard evaluation processes, identify and evaluate crystalline silica hazards and potential exposures during the planning and conduct of work.
- Review and approve the silica compliance plan or JSA.
- As necessary, quantitatively determine the presence of silica in materials, substrates, and other media. This may involve review of material safety data sheets (MSDSs), or the collection of samples (bulk and/or airborne) for analysis by a qualified laboratory.
- Provide results of silica survey to management/supervision, along with information regarding hazard potential and control measures. As appropriate, make recommendations to management/supervision to maintain, modify, upgrade, or downgrade controls accordingly.
- Take prompt corrective measures to eliminate hazards, such as recommending management/supervision to implement or modify engineering, administrative, work practice, and personal protection (including respiratory protection) controls.
- Conduct an exposure assessment, as appropriate.
- In evaluating silica hazards and specifying controls for an operation, (a) use the best available historical exposure monitoring data generated for other similar operations or activities, (b) use objective data, and/or (c) plan and conduct initial monitoring to determine exposures and assess the effectiveness of hazard controls.
- Determine exposure to crystalline silica periodically as work is conducted.
- Maintain effective records of jobs monitored, so that a historical database can be used to specify controls and eliminate unnecessary and redundant monitoring for future activities.
- Support project management/supervision in responding to exposures above allowable limits when workers were not adequately protected.
- As appropriate, participate in prejob and daily worker briefings regarding task-specific crystalline silica hazards and controls, the silica compliance plan/JSA, work practices, and other applicable information, including any changes that are made to controls or to the silica compliance plan/JSA.

## TRAINING

Training will be conducted in accordance with Practice **0000000**, Hazard Communication, for employees who will or may be exposed to silica at/above the AL on any day.

## WORK PRACTICES

The following work practices will be implemented whenever activities that disturb materials containing more than 0.1 percent crystalline silica by weight are conducted:

- A JSA will be developed in accordance with Practice **0000000**, Pre-Task Planning/Risk Analysis, to determine and document in writing those exposure control measures determined to be needed. The JSA must be maintained with project records in accordance with Practice **0000000**, Records Management and Document Control.
- Exposed surfaces will be maintained as free as practicable of silica-containing dust.
- Surfaces will not be blow-cleaned with compressed air or other forced air (such as leaf blowers).
- Wet sweeping or vacuuming will be used to clean areas. If vacuuming is used for cleaning, the exhaust air will be properly filtered to prevent release of airborne silica back into the workroom – such as by using a HEPA-filtered vacuum.
- Clothes contaminated with silica will not be blown or shaken to remove dust.
- Carcinogen warnings will be placed on containers of materials containing more than 0.1 percent crystalline silica by weight. An intact pallet load of bricks while still banded or packaged as it was received is considered a container.
- **RAMSPROZONE**- or contractor-owned/operated vehicles hauling shipments of crushed stone off site must include hazard warnings concerning the carcinogenicity of crystalline silica on their shipping papers or bills of lading.

## RESOURCES

### Global Standards

Jurisdiction	Resource
Australian Government	<a href="#">Safety and Compensation Council; List of National Codes of Practice</a>

Jurisdiction

Resource

[Safety and Compensation Council: List of National Standards  
Australian Exposure Standards for Atmospheric Contaminants](#)

European Union

[European Agency for Safety and Health at Work  
European Union Occupational Exposure Limits](#)

United Kingdom

[Construction Regulations 2007  
UK Workplace Exposure Limits \(WELs\)](#)

United States

[29 CFR 1910.1000  
29 CFR 1926.55, Appendix A](#)