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## **NAC Mechanical & Electrical Services Silica Exposure Control Plan**

Jobsite Location:

Competent Person: NAC's On-Site Foremen  
NAC Project Manager

Purpose: To minimize worker exposure to respirable crystalline silica dust and prevent exposure related illnesses.

Scope: The standard applies to all NAC employees and subcontractors who have potential occupational exposure to respirable crystalline silica, except where it remains below the action limit of 25 micrograms per cubic meter as an 8-hour time weighted average under foreseeable conditions.

# SILICA

## Written Exposure Control Program

### **Scope of the Silica Standard**

The Construction Silica Standard seeks to reduce workers exposure to respirable crystalline silica to be below the *permissible exposure limit (PEL)* of  $50\mu\text{g}/\text{m}^3$  for an 8 hour time weighted average (TWA). Although respirable crystalline silica (RCS) is a very small fraction of the visible dust, reducing visible dust, overall, will help to reduce exposure to below the PEL. NAC will use engineering controls and work practices, such as dust collection, wet cutting methods, good housekeeping, and restricted access areas to reduce employee exposure.

In the construction industry, this standard does not apply to exposure that remains below the action level ( $25\mu\text{g}/\text{m}^3$ ) over an 8-hour TWA in foreseeable conditions. “Incidental tasks” are defined as being incidental to, or a small part of, the overall task, and exposure is expected to remain below the action level for the foreseeable conditions.

*(Example: occasionally drilling holes into silica containing materials, where it is a minor part of your job task. However, if you are core drilling many holes throughout the day without engineering controls, this would most likely put you over the Action Level and be within the scope of the silica standard, and you must comply with control measures.)*

NAC performs many tasks, which may be considered “incidental” putting employees below the Action Level and therefore not be within the scope of this standard, however NAC employees should work to control dust when reasonably feasible during incidental tasks to ensure exposure is “As Low As Reasonably Allowable” contributing to a safe and healthy work environment for all.

### **Health Risks**

Silica is the one of the most common minerals on earth and is found in sand, dirt and rocks, along with many manufactured materials like concrete. Silica particles become respirable when workers chip, cut, drill, crush or grind objects that contain crystalline silica. These very small particles of silica, respirable crystalline silica (RCS), get stuck in the small alveolar sacks where oxygen is exchanged in the lungs and cause inflammatory response in the tissue, which can lead to lung disease. Exposure has been linked to lung disease, silicosis, COPD and kidney disease.

Exposure accumulates over time. A worker may develop silicosis from exposure, depending on the concentration of silica dust and the duration of the exposure:

- Chronic Silicosis: Develops after 10 or more years of exposure to crystalline silica and relatively low concentrations.
- Accelerated Silicosis: Develops 5 to 10 years after initial exposure to crystalline silica at high concentrations.
- Acute Silicosis: Develops within weeks or 4 to 5 years after exposure to very high concentrations of crystalline silica.

*(Note: all dust does not necessarily contain RCS, however the PEL of 50 micrograms per cubic meter is slightly smaller than a strand of hair, so determining concentration of RCS within a dust cloud can only be accurately achieved by using industrial hygiene sampling methods.)*

**Respirators:** NAC employees are required to wear a respirator when exposure exceeds  $50\mu\text{g}/\text{m}^3$  TWA, and shall comply with the respiratory program and:

1. Complete a respiratory medical questionnaire
2. Participate in annual fit testing to ensure their respirators fit properly and effectively protect themselves
3. Be clean shaven when required to get a proper fit
4. Identify and track the number of days required to wear a mask.

**Medical Surveillance + Exams:** Employees who are required to wear a respirator for *30 or more days per year to protect against silica exposure* are considered highly exposed, and NAC offers medical examination within 30 days after initial work assignment, unless you have received an exam that meets the requirement within the last 3 years. NAC shall offer medical surveillance every 3 years thereafter. If you are considered highly exposed as defined above, contact NAC's Safety Coordinator to schedule an exam.

NAC shall provide the Physician (PLHCP) conducting the medical exam with the Construction Silica Standard, and a description of employee's job description and tasks

Exams must be conducted by a Physician or licensed health care professional (PLHCP) and include:

1. Medical and work history
2. Physical exam, with emphasis on the respiratory system
3. A chest x-ray interpreted by NIOSH-certified B Reader
4. Pulmonary function test administered by a spirometry technician with current NIOSH approved certificate
5. Test for latent tuberculosis (initial test only)
6. Other tests as deemed appropriate by PLHCP

### **How to Comply with this Standard**

There are three options for complying with this standard.

Option 1: Follow Table 1, use good housekeeping, and restricted access zones.

Option 2: Follow work practices based on Objective Data (Table developed by NAC).

Option 3: Conduct Air Monitoring Surveillance.

NAC has conducted risk assessments of job tasks and will reduce silica exposure covered by the scope of this standard by following Table 1, and use objective data (option 2), by implementing engineering controls [Wet Dust Suppression (WDS) + Local Exhaust Ventilation (LEV)], and work procedures including housekeeping and restricted access areas to reduce silica exposure to below the PEL. For non-incident tasks that are listed in Table 1, you must follow procedures as written and wear a respirator when indicated. For anything other than what is in Table 1, you must follow the work procedures as developed by NAC based. These procedures are based on objective data indicating their effectiveness in reducing RCS exposure to acceptable limits. Deviating from these procedures will require NAC to conduct air monitoring surveillance program (Option 3) to determine if we are below the action level.

**Air Monitoring Surveillance Program:**

Following the sampling methods according to ACGIH's established standards for measuring Respirable Crystalline Silica in the breathing zone of workers, NAC will conduct air-monitoring surveillance when Option 1 and 2 do not apply.

**Initial Results + Follow Up Requirements:**

1. Below the action level (25) - No additional monitoring required.
2. Above the action level, but below the PEL (50) - Monitor again within 6 months
3. Above the PEL – Monitor again within 3 months

*Note: No additional monitoring is required after two subsequent monitoring results (excluding initial result) taken 7 or more days apart are below the action level. If results are above action level or PEL, repeat steps above. If conditions change you may need to resume monitoring.*

### **Tasks**



Tasks conducted on NAC Projects may expose workers to silica dust. NAC employees may be exposed while they or others create airborne dust from using tools on material containing silica, such as concrete and masonry. NAC employees shall follow the guidelines in the table below (or Table 1) to control dust in order to reduce exposure to respirable crystalline silica. Employees shall follow all manufacturer requirements for using tools and controls, and

ensure tools are in good working condition. When engaged in incidental tasks that are reasonably anticipated to cause exposure levels below the PEL, NAC employees are exempt from these controls, however employees should consider following these controls if jobsite conditions warrant greater precaution. Frequent inspections shall be conducted to ensure control measures are effective.







The following activities may be sources of exposure for NAC employees:


- *Sweeping*
- *Excavating and Truck Loading activities*
- *Demolition Work*
- *Hammer Drilling*
- *Core Drilling + Saw-cutting (NAC uses wet cutting methods to reduce silica exposure)*

**EXPOSURE CONTROL METHODS  
WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA**

Equipment / Task	Hazard Description	Work Practice Control Methods
<p>Housekeeping + Sweeping dust from silica containing materials</p> 	<p>Disturbing dust containing silica, causing it to become airborne, increasing risk of exposure.</p>	<p>Maintain good housekeeping practices and clean regularly throughout the day, using a Hepa filter vacuum to clean up silica dust on the jobsite. Use sweeping compound or wet down dust prior to sweeping to reduce dust when vacuums are not available. Never use compressed air to clean. Use the proper filters when vacuuming (foam filters for wet-vac, paper filters for dry vacuum). To replace vacuum bag or filter, follow manufacturer guidelines, and place in heavy-duty plastic bag for disposal. Replace filters as needed.</p>
<p>Restricted Access Zones + Containment</p> 	<p>Exposing others to silica dust</p>	<p>Restrict access to areas with high exposure potential to reduce exposure for others on the jobsite. Use warning tape, barriers, or containment methods with signage to identify that only authorized personnel shall enter the area. Enclosing in plastic will reduce ventilation and may increase exposure to those in containment area. Ventilate as needed, and use other control methods to reduce dust. The competent person (foreman) shall regularly evaluate the work area to ensure containment and restrictions are effective.</p>
<p>Good Work Practices</p>	<p>Work practices can increase or reduce exposure, and success depends on task and environment</p>	<p>Always follow good work practices to reduce visible dust. Stand upwind from the source and ensure adequate ventilation. Clean up dust immediately, and use a vacuum and wet cutting methods at the source to remove visible dust. Coordinate work to reduce exposure to others, and rotate workers to limit their exposure.</p>
<p>Use of Objective data</p>	<p>Exposure from tasks not listed or modified in Table 1</p>	<p>Monitor for visible dust. Seek to minimize visible dust and use engineering controls or have spotter hold a vacuum hose at dust source. Contact Safety Coordinator for objective data on control method.</p>
<p>Hammer Drill with integrated dust compartment (Makita SDS Plus DX01)</p>	<p>Potential exposure during drilling when dust compartment not emptied frequently</p>	<p>Empty cartridge when suction is reduced, approximately 7-8 holes. Summary of Test: conducted in room with no ventilation, result: 22µg/m3 for 1 hour of drilling 75, 5/8" x 2" holes, overhead in concrete</p>

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

Equipment / Task	Hazard Description	Engineering and Work Practice Control Methods	Respirator Required	
			≤ 4 hours /shift	> 4 hours /shift
<p>(ii) Handheld power saws (any blade diameter)*</p>  	Exposure to dust when cutting without wet cutting methods and when not using a respirator when required.	<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>	None APF 10	APF 10 APF 10
<p>(vi) Rig-mounted core saws or drills*</p> 	Exposure to dust when drilling without water	<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
<p>(vii) Handheld and stand-mounted drills (including impact and rotary hammer drills)*</p> 	Exposure to dust when drilling without LEV or wet cutting methods. Cleaning holes can also cause exposure .	<p>Use drill equipped with commercially available shroud or cowling 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
<p>(x) Jackhammers and handheld powered chipping tools*</p>  	Exposure to dust when used without LEV or wet cutting methods, or when not using a respirator when required.	<p>Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact.</p> <ul style="list-style-type: none"> <li>- When used outdoors.</li> <li>- When used indoors or in an enclosed area.</li> </ul> <p>OR</p> <p>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.</p> <ul style="list-style-type: none"> <li>- When used outdoors.</li> <li>- When used indoors or in an enclosed area.</li> </ul>	None APF 10	APF 10 APF 10

Equipment / Task	Hazard Description	Engineering and Work Practice Control Methods	Respirator Required	
			≤ 4 hours /shift	> 4 hours /shift
(xii) 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. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. OR	None	None
		Use grinder 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 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. <ul style="list-style-type: none"> <li>- When used outdoors.</li> <li>- When used indoors or in an enclosed area.</li> </ul>	None None	None APF 10
(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	Exposure to dust released during demolition with large heavy equipment.	Operate equipment from within an enclosed cab. When employees outside of the cab are engaged in the task, apply water and/or dust suppressants as necessary to minimize dust emissions.	None	None
(xviii) Heavy equipment and utility vehicles for tasks such as grading and excavating but not including: demolishing, abrading, or fracturing silica- containing materials	Exposure potential while disturbing soil, creating visible airborne dust	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.	None None	None None

(2) When implementing the control measures specified in Table 1, each employer shall: (i) For tasks performed indoors or in enclosed areas, provide a means of exhaust as needed to minimize the accumulation of visible airborne dust; (ii) For tasks performed using wet methods, apply water at flow rates sufficient to minimize release of visible dust; (iii) For measures implemented that include an enclosed cab or booth, ensure that the enclosed cab or booth: (A) Is maintained as free as practicable from settled dust; (B) Has door seals and closing mechanisms that work properly; (C) Has gaskets and seals that are in good condition and working properly; (D) Is under positive pressure maintained through continuous delivery of fresh air; (E) 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 (F) Has heating and cooling capabilities.

(3) Where an employee 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