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Bulletin *for*

Crystalline silica exposure in concrete floor trade work

Overview: Respirable silica exposure over time can lead to silicosis, a serious lung disease. Silica is present in concrete dust, making it essential to minimize worker exposure to these hazards. This bulletin summarizes the findings of a recent silica exposure assessment across various workplace tasks.

Permissible exposure limits: Workers must avoid exceeding Threshold Limit Values (TLVs), including the Time Weighted Average (TWA). TWA represents the total amount of a hazardous substance that a worker can be exposed to during an 8-hour work shift, 40 hours per week, throughout their lifetime without any negative health effects. Our objective is to keep worker exposure below the identified TWA for each product (silica) to prevent occupational illness.

Silica exposure assessment: Silica exposure assessments were conducted for the following tasks: use of a hand grinder, chipping concrete, cutting concrete, sandblasting, shot blasting, and mixing concrete. Note that several factors can affect silica exposure, such as vacuum usage with adequate filters, concrete design mix, ventilation levels, and more. Results may vary in different work environments and project locations.

Task results: The red highlighted boxes indicate work tasks that are above the exposure limit and require immediate attention/controls when workers are performing these work duties. The yellow highlight indicates caution when using action controls. The results shown in the chart below represent the readings found during the field assessment. Silica levels may differ from job to job based on the factors identified below. Furthermore, there is a reduction in dust/silica exposure the further you are from the source of the dust generation (i.e., working outside or in good ventilation compared to poorly ventilated areas).

Work Task	Respirable Dust (Limit = 3 mg/m3)	Respirable Crystalline Silica - α-Quartz (Limit = 0.1 mg/m3)	Respirable Crystalline Silica - Cristobalite (Limit = 0.05 mg/m3)
Sandblasting – outside 16.9 (536%)	16.9 (536%)	0.08 (80%)	0.02 (40%)
Hand grinding - close	7.54 (251%)	0.113 (113%)	0.038 (76%)
Hand grinding - standing	3.8 (127%)	0.057 (57%)	0.019 (38%)
Chipping – inside (poor ventilation)	15.2 (506%)	0.04 (40%)	0.005 (10%)
Chipping – inside (good ventilation)	5.4 (180%)	0.03 (30%)	0.005 (10%)
Chipping – outside	2 (66%)	0.02 (20%)	0.006 (12%)
Quick cut saw – dry concrete cutting	6.0 (200%)	0.09 (90%)	0.03 (60%)
Soff-cutting (green concrete)	1.89 (63%)	0.028 (28%)	0.0095 (19%)

Shotblasting – inside	1.22 (41%)	0.0061 (6.1%)	0.0061 (12.2%)
Shotblasting – outside	0.24 (8%)	0.0012 (12%)	0.0012 (2.4%)
Mixing concrete – outside	0.1 (3%)	0.01 (10%)	0.01 (20%)

Recommendations to control exposure levels: Prioritize engineering controls and supplement with respirators for additional exposure protection.

1. Ventilation: Work outdoors when possible. Results show better outcomes compared to poorly ventilated indoor areas.
2. Vacuum attachments with regular filter changes may reduce airborne dust levels.
3. Water may be used to suppress dust formation when cutting concrete.
4. Respirator: Workers should wear appropriate respiratory protection when any visible dust is present. A well-fitted respirator can reduce dust and silica exposure by a factor of 10. Without a respirator, workers performing sandblasting, chipping, cutting concrete, and hand grinding would exceed their TWA. A NIOSH-approved N95 mask must be worn when cutting, grinding, or modifying dry-hardened concrete.

Additional note: Workers must be clean-shaven and fit-tested for proper respiratory protection.

Remember that your health is our top priority. Follow these guidelines to protect yourself and your colleagues from concrete dust and silica exposure. If you have any questions or concerns, please visit these links:

- IHSA Chemical Hazards landing page
- Free web-based Silica Control Tool
- Current occupational exposure limits for Ontario workplaces under Regulation 833

A publication of the Concrete Floor Labour-Management Health and Safety Committee in partnership with the Infrastructure Health & Safety Association (IHSA).