

Construction Exposure Profiles: Crystalline Silica

Crystalline silica is a component of soil, sand, and rocks and most commonly occurs in the form of quartz. It is found in building materials such as stone, asphalt, brick, concrete, granite, and mortar. Crystalline silica is a very common hazard at construction work sites.

CAREX Canada estimates that

105,000

Ontario construction workers are exposed to silica.

Health Effects

Inhalation of silica dust can cause lung cancer and silicosis, an irreversible lung disease caused when silica damages and scars lung tissue. Symptoms such as shortness of breath, severe coughing, and body weakness may become more noticeable the longer workers are exposed to crystalline silica. Silica dust exposure is also a possible risk factor for chronic obstructive pulmonary disease (COPD) and idiopathic pulmonary fibrosis.

Exposure Sources and Construction Trades

CAREX Canada has identified construction as the single largest industry with exposure to silica. Some large construction trades exposed to silica are labourers, heavy equipment operators, plasterers, and drywallers, but many more are potentially exposed.

There are many activities in construction that produce dust from silica-containing materials. Examples include:

- Chipping, sawing, grinding, hammering, or drilling
- Crushing, loading, hauling, or dumping
- Mixing and cutting concrete
- Abrasive blasting
- Dry sweeping or pressurized air blowing
- Tunneling, excavating, earth moving, or blasting

Occupational Disease Risks

According to the Occupational Cancer Research Centre (OCRC) burden of cancer in Ontario report, occupational exposure to crystalline silica causes 102 lung cancers annually in the construction sector. Without intervention, this exposure will cause an estimated 3,350 lung cancer cases in the Ontario construction industry from 2030-2060.

Below are the results from the Occupational Disease Surveillance System (ODSS) in construction trades most likely to be exposed to crystalline silica. The following Table 1 shows the percent increase for lung cancer and COPD, the two most common lung diseases, in construction occupations compared to all other workers in the ODSS.

Table 1. Increased risk of lung cancer and COPD in specific construction trades occupations compared to all other workers in the ODSS.

	Lung Cancer	COPD
Excavating, grading and related	37%*	38%*
Paving, surfacing and related	22%	33%
Labouring and other elemental work in excavating, grading and paving	55%*	75%*
Excavating, grading, paving and related not elsewhere classified	35%*	32%*
Brick and stone masons and tile setters	-	16%
Concrete finishing and related	-	38%*
Plasterers and related	20%	7%
Glaziers	28%	22%
Labouring and other elemental work in other construction trades	8%*	45%*

*Statistically significant

- No increased risk observed or case numbers too small to report any increased risk

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Prevention

The occupational exposure limit for crystalline silica is 0.1 mg/m³ in Ontario. There are many effective and proactive methods that can be implemented to reduce crystalline silica exposure in the workplace.

Eliminating silica may not always be feasible but sometimes safer alternatives such as garnet for sand blasting can be used as a substitute or another process that produces less silica dust. Engineering controls could involve local exhaust ventilation, wet processing, and enclosing areas to control dust levels. Worker exposure monitoring and providing hand washing facilities on site are examples of administrative controls. Finally, personal protective equipment (PPE) may include fit-tested respirators, eye wear, and protective clothing. A study by the Institute for Work and Health and the OCRC estimated that a combination of wet method, local exhaust ventilation, and PPE use could prevent approximately 110 lung cancers in Ontario construction workers in the coming years.

Crystalline silica is a workplace hazard present in many building and construction trades. Improved control measures and comprehensive workplaces safety plans will help reduce future exposures in construction workers.



This profile was prepared by the Occupational Cancer Research Centre in collaboration with the Ontario Building Trades Council with funding from the Ontario Ministry of Labour, Training and Skills Development

Resources

CAREX Canada - Silica (Crystalline) Profile:
https://www.carexcanada.ca/profile/silica_crystalline/

Canadian Centre for Occupational Health and Safety - Respirable Crystalline Silica: Breathe Easier:
<https://www.ccohs.ca/newsletters/hsreport/issues/2017/05/ezine.html#hsreport-ontopic>

Canadian Centre for Occupational Health & Safety - OSH Answers Fact Sheet - Silicosis:
<https://www.ccohs.ca/oshanswers/diseases/silicosis.html>

Ministry of Labour, Training and Skills Development - Silica on Construction Projects:
<https://www.labour.gov.on.ca/english/hs/pubs/silica/>

Ontario Occupational Disease Statistics - Silica:
<https://www.occdiseasestats.ca/#/exposure?id=1&locale=en>

Occupational Health Clinics for Ontario Workers Inc - Silica Control Tool Pilot Program:
<https://www.ohcow.on.ca/occupational-illness/silica-control-tool-pilot-program-ontario/>

Occupational Cancer Research Centre - Burden of occupational cancer in Ontario:
http://www.occupationalcancer.ca/wp-content/uploads/2019/09/OCRC_National-Burden-Report_2019.pdf

To access this fact sheet and other health and safety and prevention information please visit:
www.obtworkplaceresource.com/health-safety