

fact sheet



*"When you can't breathe...
nothing else matters"*[®]

What is Silica?

Silica, often referred to as quartz, is a very common mineral. Silica is a mineral that constitutes a major part of the earth's crust and is found in many types of rocks and soils. Silica exists in a number of forms such as quartz, glass, or it may be combined with other elements to form silicates which are found in a large number of other rocks. Silica, or crystalline silica, is the form which can be a health hazard. Quartz is believed to have important health effects because of its shape and size, which enable it to be inhaled into the airways and small air sacs. When quartz is heated it can change into other forms of crystalline silica, which are also hazardous to health.

Who is at risk?

Silica is found in many materials common on construction sites, including soil, sand, concrete, masonry, rock, granite, and landscaping materials. Construction workers who perform tasks such as those listed below with any of the materials listed are at risk of being exposed to hazardous levels of silica dust. You may also be at risk if someone close by is generating silica dust.

TASKS	MATERIALS
Abrasive blasting	Artificial (engineered) stone
Cutting/sawing	Asphalt (for paving)
Demolishing/disturbing	Brick
Drilling Grinding	Cement
Jackhammering	Concrete
Milling	Concrete Block
Mixing	Drywall
Polishing	Fiber Cement products
Roofing	Grout
Sacking/patching	Gunite/Shotcrete
Sanding	Mortar
Scabbling	Paints containing silica
Scarifying	Plaster
Scraping	Refractory Mortar/Castables
Sweeping/cleaning up	Refractory Units
	Rock
	Roofing tiles & pavers
	Sand
	Soil (fill dirt and top soil)
	Stone (including: granite, limestone, quartzite, sandstone, shale, slate, cultured, etc.)
	Stucco/EIFS
	Terrazzo

How does it get into the lungs?

Small silica dust particles can be generated when material containing silica are drilled, cut, blasted or crushed by machinery. The very small particles can then become airborne. These dust particles can be inhaled and breathed into the lungs. The dust passes through the airways into the small air sacs called alveoli where gas exchange occurs, and can be deposited in the airways and air sacs.

Dust which enters into the air sacs of the lungs can only be removed by the local cells which engulf the particles and then carry them away from the lung tissue into the blood stream and to other parts of the body. Normally there is a balance between the amount of dust breathed into the lung and the body's ability to get rid of it from the lungs. The chance of becoming ill from exposure to silica dust depends on the tasks performed (some minerals contain more silica than others), the amount of dust they are exposed to (low exposure or high intensity exposure), and the frequency of the exposures (over a long period of time or a shorter period). Each exposure to silica adds into the total load of silica in the lungs. Those who have a high intensity exposure over a shorter time are usually associated with an increased risk. In high intensity exposure (very dusty situations) the clearance mechanism of the lungs is overwhelmed and the deposited dust then clogs the lung tissues via the airways and the air sacs. The cells within the lungs have difficulty in clearing the silica particles. The only way to get the retained dust out of the lungs is either to pass it on to other cells or cough it up in phlegm or sputum.

What can it do?

When silica dust lies within the lung tissues, chemical reactions can occur which result in tissue injury followed by the healing response of the lung. This is similar to an injury to the skin, such as a cut, which usually heals leaving a small scar. Thus, damage by quartz in the lung tissue causes a small scar, in the form of a small nodule which can be seen on a chest x-ray. This type of lung damage is called **silicosis**. Mild silicosis may not cause any symptoms. Symptoms of quartz dust exposure can be a persistent productive cough, which can be due both to the lung's attempt to clear the dust, and to some earlier injury to the airways. A feeling of shortness of breath can also be a symptom of silicosis, which is due to the fibrosis (or scarring) of the lungs.

The effect that this damage has on breathing depends upon the amount of quartz dust retained in the lung, the degree of the healing response, and the size and number of nodules) seen on the chest x-ray. Symptoms from silicosis may not be obvious and can initially include shortness of breath, chest pain, or a persistent cough. Silicosis can be severe enough to cause respiratory failure, which may eventually lead to death. This severe response can be seen in a condition known as **Progressive Massive Fibrosis (PMF)**. This condition is caused by a consolidation of the silica nodules which may cause severe disability. Another lung disease associated with silica exposure is carcinoma of the lung. Recent research, including epidemiological studies on data held by the Dust Diseases Board of New South Wales, indicates people with silicosis have an increased risk of lung cancer.

How can it be detected?

Scar tissue (fibrosis) in the lung can be detected by a simple chest x-ray showing the appearance of small nodules. If you work in an industry with a potential exposure to silica there may be a requirement for your employer to provide screening which may involve a chest x-ray, lung function testing and a medical examination. As the amount of silica retained in the lung increases, the number and frequency of these opacities also increases.

Lung function tests can be used to measure the effect of silica in the lungs. In the early stages there may be no change in lung function. However, as the silica accumulates there can be an interference of the

ability to shift air quickly, which can be measured by spirometry, or in the ability of the lung to exchange oxygen, which can be measured by special lung function tests or exercise tests.

What should I do?

If you are working or in an environment where crystalline silica is present you may well be inhaling significant amounts of silica dust. The most important measure is to reduce exposure to silica dust. Once silica is in the lung there is little that can be done to get most of it out again.

It is the responsibility of an employer to provide a safe workplace that reduces the risk and hazardous levels of exposures to silica for their employees. An organisation that uses any of the materials noted above and who have staff performing these types of tasks have a responsibility to control silica exposure and have a management plan in place.

It is also important for employees within these organisations to adhere to their Workplace Health and Safety (WHS) procedures. Attempts to isolate the job so that there is no exposure to silica or increasing the ventilation to reduce the amount of silica in the air should be made. In situations where this is not possible, then personal protective equipment which supplies filtered or clean air will reduce exposure. These measures are particularly relevant to those people working in jobs where they have daily exposure to silica. Measures must be taken to ensure that airborne silica dust is kept low and that control measures are in place and checked regularly.

The early detection and control of further exposure of silicosis is important and likely to result in the best outcomes.

If quartz dust has been retained in the lungs, it is important to reduce exposure to other respiratory hazards such as tobacco smoking. This is particularly relevant in terms of problems that could arise involving the airways, including airways obstruction and lung cancer.

If significant disability arises from silica exposure there may be compensatory avenues that could be pursued. This can be discussed with your local doctor, respiratory physician, your employer or union. Information can also be found via the Australia Government statutory body Safe Work Australia (SWA). SWA was established in 2008 to develop national policy relating to WHS and workers' compensation. Visit their website and for local national offices: <https://www.safeworkaustralia.gov.au/>

Please Note: This information is intended by Lung Foundation Australia to be used as a guide only and is not an authoritative statement. Please consult your family doctor or specialist respiratory physician if you have further questions relating to the information provided here.

For details of patient support groups in Australia please call 1800 654 301.

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