

November 2019

Silica dust in the workplace

This guidance advises PCBUs of the risks of respirable crystalline silica dust and how to control them and protect their workers.

Silicosis is a progressive and deadly disease that causes fibrosis of the lungs from the inhalation of respirable crystalline silica (RCS) dust. (RCS dust is also known to cause cancer.)

As a PCBU, you have a duty to eliminate, or use controls to minimise worker exposure to the hazard of, and risks from, RCS dust.

Respirable crystalline silica dust

Silica is a natural substance found in concrete, bricks, rocks, stone (including artificial or engineered stone found in composite kitchen benchtops), sand and clay. RCS dust is created when materials containing silica are cut, ground, drilled, sanded, polished or otherwise disturbed. RCS particles are extremely small; they can't always be seen with the naked eye.

How workers can be exposed to RCS dust

Workers in the following industries or who work with the following materials are most at risk of being exposed to RCS dust:

- quarrying
- roading
- foundries
- construction: concrete, stone, bricks, mortar, fibre cement products
- manufacturing of concrete, bricks and tiles
- kitchen benchtop manufacturing (natural and engineered stone), finishing and fitting

- abrasive blasting
- monumental masonry work
- mining
- concrete drilling, cutting, grinding, fettling, mixing, handling, dry shoveling, tunneling.

Health effects of exposure to RCS dust

Workers may develop the following lung diseases from breathing in RCS dust:

- **Silicosis:** scarring of lung tissue resulting in shortness of breath. May continue to develop even after exposure to RCS dust has stopped. The effects of silicosis are permanent. There are three types of silicosis:
 - **acute silicosis:** may occur after exposure of less than a year to very large amounts of RCS dust
 - **accelerated silicosis:** may occur after exposure to large amounts of RCS dust over a shorter period of time, typically 3 to 10 years. Has been seen in workers from the artificial/engineered stone kitchen benchtop industry
 - **chronic silicosis:** typically results from exposure to RCS dust over more than 20 years.
- **Lung cancer:** may occur in workers exposed to high levels of RCS dust over a long period of time.
- **Chronic obstructive pulmonary disease (COPD):** a chronic lung condition that can lead to breathing difficulties such as emphysema in workers exposed to high levels of RCS dust over a long period of time.

There is some evidence that exposure to RCS dust may also cause kidney disease.

Your responsibilities as a PCBU

As a PCBU, you **must** ensure the health and safety of workers and that others are not put at risk from your work.

Before starting work using artificial/engineered stone, you must complete a risk assessment and review your controls.

You **must** eliminate risks that arise from your work so far as is reasonably practicable.¹

- When deciding how (control measures) to eliminate or minimise risks, you must identify when work tasks may create RCS dust.
- Give preference to effective control measures that protect many workers at the same time.
- Talk to your workers to get their views on which control measures to use.

To eliminate RCS

- Use alternative products (eg metallic shot, slag products or grit instead of sand for abrasive blasting).

If you can't eliminate risks, you must **minimise** them so far as is reasonably practicable.

To minimise exposure to RCS dust

Instead of using engineered stone, use materials with a lower silica content. Engineered stone has approximately 90% silica compared with natural stone like marble and limestone which have around 2% silica. For more information about managing risk, see: worksafe.govt.nz

WET-WORKING CONTROL MEASURES

Freshly exposed silica particle surfaces (created due to grinding, drilling, cutting etc) may be more toxic than older weathered particle surfaces. Using water to suppress dust has the added benefit of speeding up the weathering process.

| DO | DON'T |
|---|--------------------------------------|
| Use water spray or misting systems to suppress dust. Keep the work material (eg concrete, engineered stone benchtops) wet while work is carried out on them (eg cutting, polishing, etc). Use on-tool water suppression systems to keep dust out of the air | Dry sweep work areas |
| Frequently hose down equipment and work areas with water | Use compressed air to blow away dust |

¹ 'So far as is reasonably practicable' means you first consider what is possible in your circumstances to ensure health and safety. You then consider what is reasonable to do in your circumstances. You need to achieve a result that provides the highest protection that is reasonably practicable in the circumstances.

DUST CONTROL MEASURES

- Use physical barriers or computer numerical control (CNC) machines to isolate work areas or tasks that generate dust.
- When purchasing equipment and machinery, look for dust control features and dust collection systems. For example, tools used for cutting, grinding or polishing concrete and masonry should provide water to the blade and/or be fitted with an on-tool extraction system. See: worksafe.govt.nz
- Ensure dust-generating equipment has a dust collection system with a filtered air supply to isolate the worker from the dust.
- Use an H-class vacuum cleaner in accordance with Standard AS/NZS 60335.2.69, fitted with a filter that can achieve an efficiency of 99.995% (eg H14 HEPA filter complying with Standard AS 4260). This includes working in someone's home (eg to fit a bench). Workers should not use a household vacuum cleaner to remove this dust.
- Seal dust waste bags and place them in the correct waste container.

ADMINISTRATIVE CONTROL MEASURES

- Set up exclusion zones with signs to mark the boundaries of work areas where RCS dust is created. The signs should warn workers about the hazards and specify the PPE to be used.
- Schedule potential high-exposure work for times when there are fewer workers and others around (eg breaks or after normal working hours).

PERSONAL PROTECTIVE EQUIPMENT (PPE)

- **PPE is the least effective control measure. It should not be the first or only control measure you consider.**
- PCBUs must provide PPE to workers unless another PCBU provides it or the worker genuinely and voluntarily chooses to provide their own PPE (and you are satisfied it is suitable).
- Seek expert advice when choosing PPE and consult with the workers who will be using it.

Respiratory (breathing) protection

- A respirator may be half-face, full-face or a Powered Air Purifying Respirator (PAPR) (see pictures below). The type of respirator you choose will depend on the job and the levels of toxicity and concentration of RCS. Always choose a respirator that fully protects the worker, conforms with AS/NZS 1716 and is selected in accordance with Standard AS/NZS 1715.
- Carry out fit testing for each worker who will wear a respirator that requires a seal against the face.
- Provide information, training and instruction so workers can correctly use, wear, store and maintain their PPE.



FIGURE 1:
Re-usable half-face
respirator (cartridge)



FIGURE 2:
Full-face respirator
(cartridge)



FIGURE 3:
Full-face powered
respirator (cartridge)

Protective clothing and cleanliness

- Ensure workers have overalls and gloves to wear at work. Workers should leave their dust-covered clothes at work to be cleaned. They should not wear them home.
- Ensure workers understand the importance of washing their hands before eating, drinking and smoking, and of washing up before they go home at the end of the day.
- Ensure washing facilities are provided.

Exposure monitoring

Exposure monitoring involves measuring and evaluating workers' exposure to a health hazard. It includes monitoring workplace conditions as well as biological monitoring.

- As a PCBU you **must**, so far as is reasonably practicable, monitor workplace conditions if exposure to a particular health risk warrants it.

- Exposure monitoring will confirm whether workers are exposed to RCS dust at potentially harmful levels and if your control measures are working properly.
- Exposure monitoring does not replace the need for control measures.
- You can engage an occupational hygienist from the New Zealand Occupational Hygiene Society: www.nzohs.org.nz or the Health and Safety Association of New Zealand (HASANZ) Register: <https://register.hasanz.org.nz> to measure RCS dust concentrations and help evaluate risks to worker health.
- Ask your workers for their views when making decisions about exposure monitoring.

Health monitoring

Health monitoring involves testing workers to identify any changes in their health status because of exposure to hazards arising from their work.

- As a PCBU you must, so far as is reasonably practicable, monitor workers' health if exposure to a particular health risk warrants it.
- Provide health monitoring for all your workers who may be exposed to RCS dust. You can engage an occupational health practitioner from the New Zealand Occupational Health Nurses' Association: www.nzohna.org.nz from the HASANZ Register, and/or the Australian and New Zealand Society of Occupational Medicine: <https://anzsom.org.nz> to perform health monitoring.
- Monitoring should include:
 - collection of workers' demographic, medical and occupational histories
 - records of workers' exposure
 - a respiratory questionnaire
 - respiratory function tests
 - in some cases, chest x-ray or other radiological procedure.
- You must have workers' consent before you monitor their health.
- Ask your workers for their views when making decisions about health monitoring.

Health monitoring for workers exposed to engineered stone

Due to the serious risk of developing accelerated silicosis in those working with engineered stone, an Occupational Medicine Specialist should be engaged to provide health monitoring advice and services.

Training

- As a PCBU you must, so far as is reasonably practicable, ensure workers are supervised or trained to work healthily and safely.
- Provide your workers with information, training and instruction on the control measures (including the use and care of PPE) and the potential health risks of wearing PPE. For more information, see: worksafe.govt.nz
- Ask your workers for their views when deciding how to provide information and training.

More information

Safety alert

[Accelerated silicosis](#)

Fact sheets

[Controlling dust with on-tool extraction](#)

[Respiratory Protective Equipment – advice for PCBUs](#)

[Workplace Exposure Standards \(WES\)](#)

[HASANZ Register](#)

[NZOHS](#)

[NZOHNA](#)

[ANZSOM](#)

Standards

AS/NZS 60335.2.69 Household and similar electrical appliances - Safety particular requirements for wet and dry vacuum cleaners, including power brush, for commercial use

AS 4260 High efficiency particulate air (HEPA) filters
- Classification, construction and performance