



# Managing silica dust at mining and quarry sites

## Guidance Notes



# Contents

<b>Managing silica dust at mining and quarry sites</b>	<b>3</b>
What diseases does silica dust exposure cause?	4
Who is at risk of being exposed to silica dust?	4
How do I identify if silica dust is at my site?	4
How do I manage the risk of silica dust at my site?	5
Training workers to work safely with silica dust	6
Protective Equipment	7
Health monitoring for workers	8
Air Monitoring in the workplace	9
When do I need to notify Worksafe Tasmania?	9
What will WorkSafe Tasmania inspectors be looking for when they visit my site?	9
More information	9
<b>Checklist for managing the risks of silica dust</b>	<b>10</b>
Table 2: Matrix of controls	13

# Managing silica dust at mining and quarry sites

This guidance note:

- Has been developed for persons conducting a business or undertaking (PCBUs) at mining and quarry sites.
- Explains the hazards and risks of inhaling respirable crystalline silica (also known as RCS and as silica dust)
- Includes advice about silica containing materials and products, and how to control the risks when silica dust is generated from working with them
- Explains how to support your working environment control measures with health and air monitoring.

More information for managing the risks of silica dust generated from mining and quarrying activities can be found on the WorkSafe Tasmania website at [worksafe.tas.gov.au/silicasafe](https://worksafe.tas.gov.au/silicasafe)

## What is silica dust?

Silica (silicon dioxide, crystalline silica) is a naturally occurring mineral commonly found in stones, rocks, sand, gravel and clay. Quartz is the most common form, but silica can also be found in:

Material or product	Percentage of crystalline silica
Engineered stone products	Up to 92%
Sandstone	70 to 90%
Granite	25 to 60%
Ceramic tiles	5 to 45%
Autoclaved aerated concrete panels, concrete bricks and pavers	20 to 40%
Slate	20 to 40%
Fibre-cement sheeting	5 to 40%
Concrete	Up to 30%
Bricks	5 to 15%
Marble	Up to 5%

When stone, rock, or gravel is cut, crushed, drilled or sanded, silica dust (respirable crystalline silica or RCS) is released.

Silica dust is 100 times smaller than a grain of sand and can remain in the air for long periods of time. The tiny particles are easily breathed in without workers knowing. Silica dust can become airborne when a worker:

- Cuts, chisels, or drills into stone or rock
- Jackhammers or saws stone or rock
- Blasts or crushes stones or rock containing silica
- Screens gravel containing silica
- Excavates sites with silica containing stone
- Grinds and mills powders containing silica
- Manually conveys, stockpiles, cleans, weighs or bags powders containing silica dust

Silica dust can also become airborne when a worker:

- Does housekeeping tasks like dry sweeping
- Changes filters or dust collection bags
- Removes work clothes and personal protective equipment (PPE) after working with silica containing products

## What diseases does silica dust exposure cause?

Silica dust is dangerous when generated and inhaled. It is known to cause progressive and permanent inflammation and scarring of the lungs. Breathing in silica dust can cause:

- Chronic bronchitis – inflammation of the large airways
- Emphysema – weakened air sacs of the lungs causing difficulty breathing
- Silicosis (Acute, chronic, and accelerated silicosis) – progressive and irreversible scarring of the lungs
- Lung cancer – growth of cancerous cells in the lungs
- Kidney damage – reduced function and clearance of toxins from the body by the kidneys
- Autoimmune diseases – conditions whereby the body's own immune system attacks healthy organs and tissues

Both short and long-term exposure to silica dust can be hazardous - one worker may develop a silica related disease soon after a single, high-level exposure, while another worker may not develop a silica related disease for years (even decades) after they are exposed to silica dust.

Symptoms of silica dust exposure are difficult to identify and can go undiagnosed for years leading to worse health outcomes for workers. Therefore, exposure to silica dust must be controlled and managed. This includes over the length of a shift, to make sure a worker's total average exposure is low, and within a shift, to make sure short, high exposures do not occur.

## Who is at risk of being exposed to silica dust?

The workers most at risk of being exposed to silica dust are those who use power tools or mechanical equipment on stone, rocks and other products that contain silica. This could include any worker who:

- Blasts, excavates, drills, cuts or tunnels into rock containing silica
- Dismantles equipment or disposes of offcuts covered in silica dust
- Cleans up the dust and debris created by the above activities, including changing filters or dust collection bags.

It is important to ensure that dust generated from mining or quarrying activities do not drift and expose others at or around the workplace.



*Image 1 – Silica hazard sign*

## How do I identify if silica dust is at my site?

It is important to know the types of natural material being worked with at your site; as tunnelling, excavating, and drilling natural sources can generate silica dust. Seek information from a mineralogical report to determine if quartz, cristobalite or crystalline silica naturally occurs in your mine or quarry.

Occupational Hygienists can also provide advice and assist with identifying potential sources of silica in the workplace.

## How do I manage the risk of silica dust at my site?

Eliminating exposure to silica dust is best. Where exposure cannot be eliminated, you must minimise exposure to silica dust so far as reasonably practicable, including short duration or one-off tasks. Under legislation, you must complete a risk assessment, have health and safety management systems, and a major hazard management plan in place to manage exposure to silica and dust generated at your site.

The risk of exposure to silica and dust can be managed by applying the hierarchy of controls:

Level 1	Eliminate the risk	Not applicable for mines and quarries
Level 2	Reduce the risk using substitution	Not applicable for mines and quarries
Level 3	Reduce the risk using isolation	Use automated machines Fully enclosed operator cabins, e.g., on earthmoving plant with high efficiency air filtration Apply exclusion zones
Level 4	Reduce the risk using engineering controls	No dry cutting, excavating, or drilling - use wet methods Use tool water suppression technology or dust extraction Use well positioned local exhaust ventilation Use Industrial H or M-class vacuums
Level 5	Reduce the remaining risk through administrative controls	Design shift rotations and limit task times Use signage to warn of silica dust hazards in the area Design implement and monitor housekeeping and cleaning policies and processes Prepare and follow safe work procedures
Level 6	Reduce the remaining risk with personal protective equipment	Provide respiratory protective equipment (RPE) with a suitable protection factor

To manage the risk of exposure to silica dust consider:

- What activities will workers carry out?
- Will these activities generate dust?
- Who could be exposed, how, where and when?
- Do you need to implement any control measures to minimise exposures?
- How often are equipment and tools inspected and maintained?
- How do your workers clean up?
- What training do workers need to undertake the work safely?

Managing the risk of exposure to silica dust requires a combination of high-level control measures (isolation, substitution, and engineering controls), administrative measures and personal protective equipment (PPE). Administrative

measure can include routinely cleaning the work area and vacuuming residual dust from clothing.

Due to the risk of exposure to silica dust when working in mining and quarrying, administrative controls, and the use of PPE on their own will not provide enough protection, therefore higher-level controls such as suppression and removal of dust at the source must be implemented.

Using water (wet method) to reduce dust when cutting, drilling or excavating etc., significantly reduces the risk of exposure. However, it does not eliminate the risk completely. Using a wet method with local exhaust ventilation, or dust collection, has been shown to significantly reduce airborne dust. Respiratory protective equipment should be used, and all collected dust or slurry removed before it dries and poses a dust risk.



You can control the risk of dust exposure by:

- Keeping dust generating activities physically separated from other work areas
- Changing the way dust generating tasks are carried out, for example using wet methods
- Collecting dust as it is generated by using local dust extraction with a filtering or collection system
- Fitting large machinery (excavators and bulldozers) with cabs that have an air filtering system
- Cleaning machinery cabs and equipment using an industrial H-class or M-class vacuum cleaner with a HEPA filter, or by wet sweeping/mopping
- Cleaning office spaces using an industrial H-class or M-class vacuum cleaner with a HEPA filter, or by wet sweeping/mopping
- Bagging and disposing of dust or slurry using a strong, durable bag or those provided with your dust extraction equipment

You should support the higher-level risk controls above with signage and housekeeping policies and procedures that include:

- Maintenance schedules for equipment and filter changes according to the manufacturer's instructions
- How to dispose of the dust in your dust extraction systems (such as filters or bags), so they do not cause a secondary exposure risk when they are being changed or disposed of

- Provision of decontamination spaces for dusty PPE and changing clothes, which can be supported by using coveralls or providing a laundering service
- Provision of designated dust-free areas for breaks, eating and drinking

Remember, the controls you put in place may pose additional hazards. For example, using wet methods can introduce a slip, trip and fall hazards. You must ensure that the risks posed by these hazards are also managed.

Encourage workers to talk to you, or their Health and Safety Representative (HSR) about any concerns they have with their work, and to promptly report any problems with their equipment or PPE.

## **Training workers to work safely with silica dust**

Workers must be provided with suitable training to ensure they understand:

- The risks of working around silica dust
- The control measures in place to protect them and their co-workers
- How to use PPE correctly, including respiratory protection
- Health monitoring they will be required to undertake



# Protective Equipment

***Personal protective equipment (PPE) including respiratory protective equipment (RPE) must not be relied upon as a primary means of controlling exposure to silica dust.***

After implementing higher-level control measures such as water suppression and on-tool dust vacuum extraction, personal protective equipment (PPE) and respiratory protective equipment (RPE) must be considered. PCBU's are responsible for providing suitable PPE and RPE to workers so they can carry out tasks safely.

When selecting RPE for workers, PCBU's must ensure:

- The RPE is appropriate for the task and any hazards associated with the task
- The RPE has the appropriate Assigned Protection Factor (APF) (as per table 2 at the end of this document)
- The RPE is a suitable size, fits well, and is reasonably comfortable for the worker to wear for the required length of time
- The RPE is regularly inspected for damage to the filters or worn areas on the seal, and is repaired or replaced if damage is identified
- The RPE is clean and in good working order
- The RPE is used and worn by the worker it was supplied to

It is essential that RPE for workers has been fit tested because every worker's face is a different shape, and one type of mask will not be suitable for everyone. Fit testing is carried out by a trained person, usually an Occupational Hygienist, who measures the effectiveness of the seal between the worker's face and the mask. A competent fit tester has:

- Knowledge of the mask or respirator being tested
- The ability to carry out the test, use the equipment and evaluate the results
- The ability to identify causes of fit test failure and provide suitable recommendations

Measuring the effectiveness of the seal is not the only thing to be considered when selecting RPE. Employers and workers should discuss with the occupational hygienist other PPE required

to be worn in the workplace. It is important for respiratory protective equipment to work in combination with other PPE worn by a worker and not introduce new hazards such as ill-fitting hearing or head protection or obscuring of vision.

The training of workers on RPE and PPE should be carried out to ensure RPE and PPE is worn appropriately and as intended to keep workers safe. Training can be delivered by anyone with expertise in RPE and silica dust in the workplace. Training should cover:

- What RPE and PPE is required
- Why and when RPE and PPE is required
- How RPE and PPE works, and any limitations on its use
- How to correctly put on and take off RPE, and any relevant PPE
- How to conduct a fit check
- How to clean and maintain RPE and PPE
- When and how to replace filters and batteries (including rechargeable batteries)
- How and where to store RPE and PPE when not in use

PCBU's should establish a system for managing workers' use of RPE and PPE over time. The system should include:

- A maintenance, storage, and repair program
- Policy and procedures on use of RPE and PPE when working with silica products
- A facial hair policy stipulating the requirement for workers to be clean shaven
- Training, supervision, and information distribution
- Routine for determining when RPE selection should be reconsidered, for example, when a worker gains or loses substantial weight, grows facial hair, or there is suspicion the RPE is not adequate for protection

Working with an expert in work, health and safety or an occupational hygienist is the best way of ensuring your workers will be safe when handling silica containing materials.

## Health monitoring for workers

Exposure to silica dust poses a significant risk to worker's health. Under work health and safety laws, PCBUs must organise and pay for health monitoring for all workers at risk of silica exposure. To help you determine who should receive health monitoring consider:

- Which workers undertake tasks that could generate silica dust
- Which workers clean workspaces or equipment use on silica containing material or products
- The people who work in the vicinity of material or products containing silica being worked on

There are three instances in which health monitoring should occur:

1. Entry Medicals: before a worker starts work for the first time, to establish a baseline from which changes can be detected. An exception to this is if a worker has participated in health monitoring prior to starting employment with you (no greater than 2 years before hand), and the results of those tests are available
2. Yearly, or more frequently if determined by a relevant health professional
3. Exit Medical: at the end of a worker's time working for you, for example, before retirement or when there are any permanent changes to a worker's duties.

Health monitoring is carried out by a registered health professional who has knowledge of silica exposure and silica related diseases. Generally,

health monitoring will include a questionnaire, lung function tests, and a chest x-ray or high-resolution computed tomography (High Resolution CT Scan). The health professional will decide which tests are needed based on:

1. Type of work being undertaken
2. Products or materials being worked with
3. Worker's exposure history
4. Air monitoring records

The health professional may ask to inspect the workplace as part of the health monitoring program. The frequency of health monitoring should be guided by the health professional and may vary between workers.

Like medical records, health monitoring records are to be kept confidential. As the PCBU, you are required to provide a copy of the health monitoring report to the worker, and store records securely for 30 years. Should the worker have any questions about the report and their health, they should be encouraged to speak with the health professional who conducted the monitoring, or their own General Practitioner (G.P).

Should you become aware that a worker has developed a disease, illness, or injury, this must be reported to WorkSafe Tasmania as soon as possible.

For detailed information about health monitoring, see the Safe Work Australia website at [safeworkaustralia.gov.au](https://safeworkaustralia.gov.au).





## Air Monitoring in the workplace

In December 2021, a new workplace exposure standard for monitoring silica dust in the air came into effect. This workplace exposure standard is an eight-hour time weighted average (TWA) of 0.05 milligrams per cubic metre (mg/m<sup>3</sup>). Meaning, workers must not be exposed to air silica dust levels above 0.05mg/m<sup>3</sup>. Monitoring silica dust in the air should be done by a competent person such as an Occupational Hygienist. It is important to remember that air monitoring is not a preventative measure, but simply a tool to help you determine if the higher-level controls you have implemented are effective in reducing silica dust exposure.

Air monitoring is required:

1. When you are unsure if you are exceeding the exposure standard, such as when you have implemented new controls or when selecting suitable RPE, or
2. If you are trying to determine if there is a risk to the health of your workers or others at your workplace

An Occupational Hygienist can assess your workplace and provide advice on the type of air monitoring required and how often it should be performed. They can also undertake air monitoring in the workplace and provide a report that will state exposure levels and whether the standard is being exceeded. As part of the report, they can recommend control measures to be implemented to ensure workers are not exposed beyond the standard.

PCBUs must store and maintain air monitoring reports for 30 years.

## When do I need to notify Worksafe Tasmania?

If a serious event or dangerous incident (notifiable incident) occurs, a PCBU or whoever is in control must notify WorkSafe Tasmania.

In addition to this notification, WorkSafe Tasmania should be notified immediately when:

- there is a failure of physical isolation or engineering controls as this results in an uncontrolled emission of a substance (such as silica dust), or
- a health monitoring report shows an injury, illness or disease in a worker or where the doctor recommends a review of workplace controls.

## What will WorkSafe Tasmania inspectors be looking for when they visit my site?

WorkSafe Tasmania inspectors will be looking at safety and health risks at your site. When it comes to silica dust, inspectors will focus on:

- How the risk of silica dust exposure at the site was identified and communicated
- The documented risk assessment for silica dust generating tasks
- Whether air monitoring has been undertaken, and what the results were
- The combination of control measures in place and their effectiveness
- A record of the actions taken on each of the risk control measures recommended by the Occupational Hygienists and, if not implemented, the site's justification
- Housekeeping policies and procedures
- Suitability of the workplace environment for the tasks being undertaken
- The RPE and PPE provided, how it was selected, fit testing records, appropriate storage and maintenance schedule for replacing filters
- That workers have been provided health monitoring, and that the health monitoring reports are available

Attached is a checklist for managing the risks of silica dust. It will help you identify silica risks in the workplace, and whether you have measures in place to protect workers from silica dust. Use this checklist to perform a self-assessment of your workplace.

## More information

Further information on silica and PCBU responsibilities in managing silica risks can be found at:

- WorkSafe Tasmania - [worksafe.tas.gov.au](https://worksafe.tas.gov.au)
- Safe Work Australia - [swa.gov.au](https://swa.gov.au)
- [Workplace exposure standards for airborne contaminants](#)
- [Guidance on the interpretation of workplace exposure standards for airborne contaminants](#)

# Checklist for managing the risks of silica dust

You can use this checklist to help guide your management of silica dust at your site.

This checklist follows the regulatory requirements under the Work Health and Safety Act 2012, and the Work Health and Safety Regulations 2022.

The Mines Work Health and Safety (Supplementary Requirements) Act 2012 and Mines Work Health and Safety (Supplementary Requirements) Regulations 2022 (e.g., r10 & r21) are also relevant to this checklist.

Each workplace is different and the level and number of risks of exposure to silica dust will depend on your trade, tasks and the materials you use. There may be some questions that are not relevant for your workplace.

More information can be found:

- On the WorkSafe Tasmania website at [worksafe.tas.gov.au](https://worksafe.tas.gov.au)
- By calling WorkSafe Tasmania on 1300 366 322
- In the Matrix of controls after this checklist
- In this Guidance Note

Work health and safety regulation	Managing risks	☑
r34	Has silica been identified as a hazard?	
	Has the PCBU identified all materials and products that contain crystalline silica?	
r36 (3)	Has the PCBU implemented one or more higher level control measures?	
	Is work with silica containing materials or products isolated?	
	Are workers performing work in the immediate vicinity of visible dust that a person would reasonably believe contains respirable crystalline silica (RCS)?	
	Are engineering controls implemented?	
	Are wet methods in use?	
	Are dust extraction methods used either on tool or local exhaust?	
r40 (e)	Is there adequate ventilation to perform work?	
r36 (4)	Are the higher-level controls supported by administrative controls?	
	Are there appropriate policies and procedures prepared for: <ul style="list-style-type: none"> <li>• Housekeeping?</li> <li>• Cleaning and disposing of slurry?</li> <li>• Equipment maintenance?</li> </ul>	
	Is there signage?	
r36 (5)	Is appropriate personal protective equipment provided?	
r44	Is it suitable to support higher order control measures?	
	Is the protection factor afforded suitable?	
r37 & 38	Is there a schedule of review and maintenance for the control measures implemented?	



Work health and safety regulation	Managing risks	☑
r351 (s19)	Is the PCBU managing the risk of silica at the workplace?	
<b>Respiratory protective equipment (RPE)</b>		
r44(2)	Has the PCBU (or another person) provided RPE for use by the workers at the workplace to control the remaining risk?	
r44(3c)	Is RPE being worn or used by a worker(s)?	
	Is the RPE provided suitable for the RCS risk?	
r44(3ai)	Is the RPE provided consistent with that recommended by the safety data sheet (SDS) or product information sheet?	
	Does the RPE have an appropriate assigned protection factor (APF)?	
r44(3b)	Is the RPE clean and in good operating order?	
r44(3a)	If RPE is tight fitting, has a fit test been completed (in accordance with AS1715)?	
r44(4)	Has the worker been provided training for the use, wearing, storage and maintenance of their RPE?	
r46	Is the worker wearing their RPE in accordance with their training?	
	Is the worker following clean shaven policies?	
	Is there evidence that the worker conducts a fit check when putting on and wearing their RPE?	
r49	Can the PCBU demonstrate that the workplace exposure standard is not being exceeded?	
r50	Has air monitoring been undertaken to confirm workplace exposure standard has not been exceeded or to determine a risk to health?	
<b>Engineering Controls</b>		
r351(1)	Are water suppression and/or dust extraction methods being used?	
	Is it sufficient?	
	Is it well directed?	
	If water suppression is being used, is the mist controlled and slurry collected?	
	If dust extraction is used being used, is it capturing the majority of visible dust generated?	
	If dust extraction plant (vacuum cleaner/dust extraction unit) is being used, does the plant or plant filter system meet the requirements of at least M-class (H-class is also acceptable) as described in AS 60335.2.69?	
	Is a tool-mounted dust extractor fitted with a HEPA filter?	
<b>Safety Signage</b>		
r353	Has signage been erected?	
<b>Health monitoring</b>		
r368	Has relevant health monitoring been provided to all relevant workers?	

Work health and safety regulation	Managing risks	☑
r375	Have workers been provided with a copy of their individual health monitoring report?	
<b>Duty of Care</b>		
r376	Have health monitoring reports been provided to WorkSafe Tasmania when they contain advice that test results indicate a disease, injury or illness or recommendations to take remedial actions?	
s19 (c)	Are safe systems of work established, maintained and regularly reviewed?	
	Are these systems adequate to manage the risk?	
s19 (f) r 39	Have workers been provided information, training, instruction and supervision necessary to protect all persons from risks to health and safety?	
	Is there evidence of training for working with silica?	
	Is there evidence of training for RPE?	
s19 (g)	Is the health of workers and conditions at the workplace monitored for the purpose of preventing illness and injury?	



Table 2: Matrix of controls

Task/Product	Combination of control measures and supporting requirements*							
	Do I need isolation controls?	What cutting method should I use?	What dust collection or ventilation do I need?	What administrative controls do I need?	Do I need to provide RPE and what kind?	Do I need to organise air monitoring?	Do I need to provide health monitoring?	What else do I need to do?
Red: Engineered stone and high content silica materials	Yes: Significant exclusion zones from other workers  RPE worn for surrounding workers	Wet only**	Local exhaust and/or H-class on tool dust extraction	Signage Housekeeping policy Maintenance policy for plant, equipment and PPE  Clean shaven policy for tight fitting RPE  Task scheduling	Yes: APF 25-50 for operator	Yes, for control effectiveness and compliance as indicated	Yes, and consider exposure of surrounding workers	Fit testing of RPE
Orange: Silica content up to 50%	Yes: Significant exclusion zones from other workers with RPE worn for surrounding workers	Wet only**	Local exhaust and/or H-class on tool dust extraction	Signage Housekeeping policy Maintenance policy for plant, equipment and PPE  Clean shaven policy for tight fitting RPE  Task scheduling	Yes: APF 25-50 for operator	Consider when changing controls	Yes, and consider surrounding workers	Fit testing of RPE
Orange: Silica content up to 25%	Yes: Exclusion zones with RPE worn for surrounding workers		Local exhaust or H- or M-class on tool dust extraction  Where controlled, modification can be undertaken outdoors	Signage Housekeeping policy Maintenance policy for plant, equipment and PPE  Clean shaven policy for tight fitting RPE	Yes: APF 10-25 for operator			Fit testing of RPE
Yellow tasks: Silica content <15%	Consider exclusion zones	Wet or Dry with manual tools and dust capture	Local exhaust or M-class on tool dust extraction  Where controlled, modification can be undertaken outdoors	Housekeeping policy Maintenance policy for plant, equipment and PPE	As indicated or as a backup for failure of higher-level controls	Control effectiveness and compliance	Yes, if exposure is significant	As indicated

\* The combination of control measures that you use should be informed by your risk assessment. Each control should complement the combination, for example when using wet cutting methods, the dust collection or ventilation method should be appropriate to collect any mists that are generated.

\*\* Cutting method should ensure that there is no uncontrolled dry cutting of silica containing materials and products.

**PLEASE NOTE**

This information is for guidance only and is not to be taken as an expression of the law. It should be read in conjunction with the Work Health and Safety Act 2012, the Work Health and Safety Regulations 2022, Mines Work Health and Safety (Supplementary Requirements) Act 2012, Mines Work Health and Safety (Supplementary Requirements) Regulations 2022 and any other relevant legislation.

To view, go to the WorkSafe Tasmania website at [worksafe.tas.gov.au](https://www.worksafe.tas.gov.au)

Under these laws, the term ‘Person Conducting a Business or Undertaking’ or ‘PCBU’ is used rather than ‘employer’.

We welcome your feedback on this guide. Send to: [wstinfo@justice.tas.gov.au](mailto:wstinfo@justice.tas.gov.au)

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