



# Assessing if the processing of silica is high risk – case studies

## WHS Regulations 529CA

Identifying processing of a CSS that is high risk

If you, as a person conducting a business or undertaking (PCBU), have identified that processing of a crystalline silica substance (CSS) is carried out at your workplace, you must assess whether the processing is high risk and document this in writing. If you are unable to determine if the processing is high risk, you must assume it is high risk until you are able to determine otherwise, through a subsequent assessment.

When determining whether the processing of a CSS is high risk, and therefore reasonably likely to result in a risk to the health of a person at the workplace, a PCBU must have regard to the following:

- a. the specific processing that will be undertaken,
- b. the form or forms of crystalline silica present in the CSS,
- c. the proportion of crystalline silica contained in the CSS, determined as a weight/weight (w/w) concentration,
- d. the hazards associated with the work, including the likely frequency and duration that a person will be exposed to respirable crystalline silica,
- e. whether the airborne concentration of respirable crystalline silica that is present at the workplace is reasonably likely to exceed half the workplace exposure standard (WES<sup>1</sup>),
- f. any relevant air and health monitoring previously undertaken at the workplace, and
- g. any previous incidents, illnesses or diseases associated with exposure to respirable crystalline silica at the workplace.

There is no one factor that can determine the outcome of your assessment. When assessing whether the processing of a CSS is high risk you must have regard to all of these factors. This is because there are instances where two identical CSS processes may produce different assessment outcomes. For example, processing of a CSS may be determined to be high risk if it is performed for longer durations on a frequent basis. Whereas, the same processing, using the same CSS, may be determined not high risk if it is performed for short durations and infrequently.

<sup>1</sup>The [workplace exposure standard](#) for RCS in Australia is 0.05 mg/m<sup>3</sup> (8 hour time weighted average).



### **WHS Regulation 529B**

When processing of a CSS is controlled

### **WHS Regulation 529C**

Duty for processing of a CSS to be controlled

As a PCBU, you must not carry out, or direct or allow a worker to carry out, processing of a CSS (regardless of whether it is high risk or not) unless the processing is controlled. Under regulation 529B(1) of the WHS Regulations, the processing of a CSS is controlled if:

- a. control measures to eliminate or minimise risks arising from the processing are implemented so far as is reasonably practicable; and
- b. at least 1 of the following measures are used during the processing:
  - i. the isolation of a person from dust exposure;
  - ii. a fully enclosed operator cabin fitted with a high efficiency air filtration system;
  - iii. an effective wet dust suppression method;
  - iv. an effective on-tool extraction system;
  - v. an effective local exhaust ventilation system; and
- c. a person still at risk of being exposed to respirable crystalline silica after 1 or more of the measures in paragraph (b) are used:
  - i. is provided with respiratory protective equipment; and
  - ii. wears the respiratory protective equipment while the work is carried out.

If it is not reasonably practicable to implement at least one of the isolation or engineering controls outlined in paragraph (b) above, the processing of a CSS will only be considered controlled if a person who is at risk of being exposed to respirable crystalline silica during processing of a CSS is:

- provided with appropriate respiratory protective equipment; and
- wears the respiratory protective equipment correctly while the work is carried out.

## Applying the hierarchy of control measures to manage respirable crystalline silica risks

In addition to controls being specifically addressed in regulation 529B, crystalline silica is a hazardous chemical under the WHS Regulations. This means that you must also ensure that you are managing risks to health and safety from exposure to respirable crystalline silica at the workplace in accordance with Part 3.1 of the WHS Regulations. This requires you to, among other things, manage risks in accordance with the hierarchy of control measures. The hierarchy of control measures ranks control measures from the highest level of protection and reliability to the lowest level. The different types of control measures are set out in the Code of Practice: Managing risks of respirable crystalline silica in the workplace which describes them in detail from highest order (i.e. elimination) to lowest (i.e. administrative controls and personal protective equipment).

Below are some case studies to assist you in determining whether the processing of a CSS in your workplace is high risk. Case study four also provides some guidance on considering reasonably practicable control measures.

## Case study one – Julia’s Electrical

Julia is an electrician who regularly installs power points in kitchens and bathrooms that contain ceramic tiles. Any drilling is often for a short duration, and Julia uses an effective on-tool dust extraction system on her drill as an engineering control. She has determined for this type of work that she is able to minimise risk so far as is reasonably practicable using these controls and does not need to wear respiratory protective equipment.

For the purposes of regulation 529CA, Julia identifies that her work involves processing of CSS because it requires Julia to drill holes into the ceramic tiles that contain crystalline silica.

Julia conducts an assessment to determine if the processing is high risk or not, and documents the following:

The specific processing that will be undertaken	Drilling holes into ceramic tiles
The forms of crystalline silica present	Julia confirmed with the property owner that the tiles are ceramic tiles containing quartz.
The proportion of crystalline silica contained in the CSS, as a (w/w) concentration	As the tiles are ceramic, Julia considers the likely crystalline silica content to be 30% w/w.
The hazards associated with the work, including the likely frequency and duration that a person will be exposed to respirable crystalline silica	Due to the variety of electrical work Julia performs, she estimates that the processing of CSS is undertaken infrequently (up to 10 times a week) and that each processing of a CSS is for a short duration (less than 5 minutes per installation).
Whether the airborne concentration of respirable crystalline silica that is present at the workplace is reasonably likely to exceed half the WES	Julia ensures processing is controlled in accordance with regulation 529B, by using an on-tool dust extraction system on her drill as an engineering control to reduce the airborne concentration of respirable crystalline silica. In combination with the infrequent nature and short duration of her processing of a CSS, it is reasonable for Julia to conclude that the airborne concentration of respirable crystalline silica is unlikely to exceed half the WES.
Results from relevant air and health monitoring previously undertaken at the workplace	Julia does not have access to any relevant air or health monitoring results.
Previous incidents, illnesses or diseases associated with exposure to respirable crystalline silica at the workplace	There have been no previous incidents, illnesses or diseases.

Considering the information above, Julia makes a written record that despite the likely crystalline silica content of the tiles, because the processing is done infrequently, for short durations and there are no previous incidents, illnesses or disease the processing is **not high risk**.

## Case study two – Hassan’s denture clinic

Hassan is a dental prosthetist who owns and runs a denture clinic. Whilst some of Hassan’s dentures are made from acrylic resins, he primarily makes porcelain dentures as they last longer. Hassan is clean shaven and normally wears a P2 filtered mask that has been fit-tested and complies with the requirements of AS/NZS 1716:2012 when casting, abrasive blasting, grinding and polishing porcelain dentures.

For the purposes of regulation 529CA, Hassan identifies that his work involves the processing of CSS because denture manufacturing requires him to cast, abrasive blast, and grind the porcelain dentures indoors, sometimes for a full 8-hour workday.

Hassan conducts an assessment to determine if the processing is high risk or not, and documents the following:

<b>The specific processing that will be undertaken</b>	Casting, abrasive blasting, grinding and polishing porcelain dentures.
The forms of crystalline silica present	Quartz
The proportion of crystalline silica contained in the CSS, as a (w/w) concentration	Hassan obtains an SDS for the dental porcelain he uses which states the crystalline silica content to be 20% w/w.
The hazards associated with the work, including the likely frequency and duration that a person will be exposed to respirable crystalline silica	<p>During a typical workday, Hassan handles a small quantity of CSS, generally measured in grams. Consequently, the amount of respirable crystalline silica generated during denture manufacturing is even smaller.</p> <p>Hassan frequently manufactures porcelain dentures, sometimes for long durations up to a full 8-hour workday.</p> <p>Hassan ensures processing is controlled in accordance with regulation 529B, by always using a fume cabinet as an effective local exhaust ventilation system.</p>
Whether the airborne concentration of respirable crystalline silica that is present at the workplace is reasonably likely to exceed half the WES	<p>Hassan does not have access to any exposure data relevant to his crystalline silica processing.</p> <p>He has consulted the fume cupboard manufacturer, and his model effectively removes and filters 99% of dust particles. He also has regular testing and maintenance of the system performed by a competent person to ensure it is working as intended.</p> <p>Even though he is regularly processing CSS, the amount of porcelain processed is small. Considering this and the highly efficient filtration system of the fume cupboard, he determines it is not reasonably likely that the airborne</p>

	concentration of respirable crystalline silica will exceed half the WES.
Results from relevant air and health monitoring previously undertaken at the workplace	No relevant air monitoring results as indicated above, and no relevant health monitoring results are available.
Previous incidents, illnesses or diseases associated with exposure to respirable crystalline silica at the workplace	There have been no previous incidents, illnesses or diseases.

Considering the above information, Hassan documents that although the dental porcelain he uses contains crystalline silica and he frequently manufactures the dentures, sometimes for long periods, the activity is **not high risk**. This assessment is primarily based on the fact Hassan handles minimal quantity of CSS, typically measured in grams, with the resulting potential generation of respirable crystalline silica being even lower. Additionally, he uses a highly efficient dust filtration system that undergoes regular testing and maintenance by a competent person to ensure it functions as intended. His assessment is further supported by the absence of any previous incidents, illnesses, or diseases related to the processing.

## Case study three – Demolition of a structure

A contractor wins a job to demolish a medium sized building consisting of bricks and concrete-based products. The work will involve using a rock hammer attachment on an excavator to demolish the structure. There is an overhead electrical power line within 4 metres of a perimeter wall to be demolished – due to this an electrical spotter is required to spot for the excavator operator while the excavator is within 3 – 6.4 metres of the powerline.

For the purposes of regulation 529CA, the contractor identifies the demolition task involves processing of a CSS because of the use of mechanical plant to crush materials that contain crystalline silica.

The contractor conducts an assessment, in consultation with workers, to determine whether the processing of a CSS is high risk. They document the following:

<b>The specific processing that will be undertaken</b>	Demolition of a medium sized building consisting of bricks and concrete-based products with an excavator fitted with a rock hammer attachment
The form of crystalline silica present	Quartz
The proportion of crystalline silica contained in the CSS, determined as a weight/weight (w/w) concentration	It is industry knowledge that bricks and concrete contain between 25 to 40% crystalline silica.
The hazards associated with the work, including the likely frequency and duration that a person will be exposed to respirable crystalline silica	The demolition will take around 2 weeks to complete, with workers undertaking the processing of a CSS (and therefore potentially exposed to respirable crystalline silica) for approximately 5 hours each day.
Whether the airborne concentration of respirable crystalline silica that is present at the workplace is reasonably likely to exceed half the WES <sup>[6]</sup>	Results of previous air monitoring for workers involved in similar demolition projects show half the WES for respirable crystalline silica was exceeded. The results are directly related to the task, controls and conditions at the new worksite and therefore indicate it is likely that the airborne concentration of respirable crystalline silica will exceed half the WES.
Results from relevant air and health monitoring previously undertaken at the workplace.	Air monitoring results are considered as described above. No relevant health monitoring results are available.
Previous incidents, illnesses or diseases associated with exposure to respirable crystalline silica at the workplace	There have been no previous incidents, illnesses or diseases.

Considering the above information, the contractor documents that the processing is **high risk** as:

- the demolition activities are carried out over an extended period; and
- historical air monitoring data suggests that the airborne concentration of respirable crystalline silica is likely to exceed 50% of the WES.

In consultation with workers, the contractor develops a silica risk control plan in accordance with regulation 529CB that includes the risk assessment undertaken under regulation 529CA and identifies all processing of a CSS that will be carried out at the workplace that is high risk. As part of the silica risk control plan, the contractor documents the controls measures and how they will be implemented to ensure that the processing is controlled as per regulation 529B, namely:

- An exclusion zone will be set up around the working area to prevent people not directly involved with the demolition being exposed to the airborne dust.
- A water-spraying system will be attached to the hammer to produce a fine mist to suppress dust at the working area.
- A water-mist fan will be used to provide further fine water spray to the working area.
- The demolition excavator cabin:
  - is fitted with a positive-pressure, HEPA filtered system to reduce the risk of respirable crystalline silica being drawn into the cabin, and
  - is enclosed and the doors and windows will be kept shut, air flow will be put on recirculation and the cabin will be cleaned every day using wet wiping/cleaning methods or a H- or M-class industrial vacuum.

The contractor also sets up a program to monitor and review the effectiveness of all control measures and documents this in his silica risk control plan.

In addition to this, the contractor organises for:

- Workers processing the CSS or at risk of exposure to respirable crystalline silica to be provided with the silica risk control plan before they commence processing in accordance with regulation 529CC and to receive crystalline silica training in accordance with regulation 529CD.
- Personal air monitoring to assess the effectiveness of the control measures.
  - The air monitoring results will help determine the effectiveness of the control measures that are now in place. If the results indicate the airborne concentration of respirable crystalline silica exceeds the workplace exposure standard, the results will be reported to the WHS Regulator (regulation 529CE).
  - The air monitoring results can also inform the selection of any respiratory protective equipment that is required to minimise any remaining risks of exposure.
- Health monitoring to be provided to workers who are not working in a positive-pressure, HEPA filtered cabin, and carrying out ongoing work, in accordance with Division 6 of Part 7.1 of the WHS Regulations.
  - This includes ensuring the health monitoring is conducted or supervised by a registered medical practitioner with health monitoring experience. The medical practitioner will advise on the frequency of health monitoring



required. Workers must be consulted on the selection of medical practitioner. Workers must also be provided with a copy of the health monitoring report.

- The contractor must provide the WHS Regulator with a copy of any health monitoring report where the results indicate that the worker may have contracted a disease, injury or illness as a result of exposure to respirable crystalline silica, or the report recommends he undertake remedial measures, including removing workers from work involving processing of a CSS.
- The electrical spotter and any other person who is at risk of exposure to respirable crystalline silica from the work must:
  - be provided with appropriate respiratory protective equipment, and
  - wear the respiratory protective equipment while the work is carried out.
- Considering the requirements of AS/NZS 1715:2009 and the air monitoring results, the contractor decides that a P2 filtered mask that complies with AS/NZS 1716:2012 (including having an adequate protection factor for the airborne concentration of RCS) is appropriate for workers when working outside a positive pressure, HEPA filtered cabin. The contractor ensures anyone who is provided with a P2 filtered masks is provided information, training and instruction on how to use, store and maintain the mask. This includes ensuring the mask is fit-tested to the wearer.
- Demolition material will be loaded into purpose-built trucks, moistened to suppress dust and the load covered for transport by a construction waste disposal services company for safe disposal in accordance with jurisdictional requirements.

## Case study four – Silversmith

Marcella is a silversmith who operates a business as a sole trader from a small workshop. In Marcella's job she is often cutting, filing, hammering, or polishing metal and materials.

For the purposes of regulation 529CA, Marcella identifies that her metal finishing work involves processing of a CSS, for example polishing with tripoli polishing compound. It is reasonably likely that Marcella, and other workers who share the workshop, will be exposed to respirable crystalline silica during these tasks if they are done indoors. Marcella conducts these tasks outdoors using a mobile workstation, in an area with good ventilation.

Marcella proceeds to undertake an assessment to determine if the processing is high risk. She documents the following:

The specific processing that will be undertaken	Polishing a silver ring with tripoli
The form of crystalline silica present	Quartz (tripoli)
The proportion of crystalline silica contained in the CSS, determined as a weight/weight (w/w) concentration	From the safety data sheet received with her tripoli polishing compound, Marcella identifies the compound contains 60-70% crystalline silica.
The hazards associated with the work, including the likely frequency and duration that a person will be exposed to respirable crystalline silica	Marcella is infrequently (5 times a week) undertaking processing of a CSS for a short duration (10-20 minutes) outdoors in an area with good ventilation.
Whether the airborne concentration of respirable crystalline silica that is present at the workplace is reasonably likely to exceed half the WES	Marcella uses a small amount of tripoli polishing compound to polish a silver ring outdoors. It is reasonable for Marcella to conclude that the airborne concentration of respirable crystalline silica is unlikely to exceed half the WES.
Results from relevant air and health monitoring previously undertaken at the workplace	Marcella does not have access to any relevant air or health monitoring results.
Previous incidents, illnesses or diseases associated with exposure to respirable crystalline silica at the workplace	There have been no reports of previous incidents, illnesses or diseases.

Considering the above information, Marcella documents that although the tripoli polishing compound she uses contains a relatively high amount of crystalline silica, the processing is **not high risk** as:

- only a small amount of tripoli is used
- polishing is undertaken outdoors
- polishing is done infrequently, for short durations, and
- there are no previous incidents, illnesses or disease.

Although not high risk, Marcella must still ensure that the processing of the CSS is controlled in accordance with regulation 529B. She considered whether it is reasonably practicable to implement any of the prescribed control measures:

- the isolation of a person from dust exposure;
- a fully enclosed operator cabin fitted with a high efficiency air filtration system;
- an effective wet dust suppression method;
- an effective on-tool dust extraction system; or
- an effective local exhaust ventilation system.

Marcella determined that it is reasonably practicable for her to process the CSS outdoors, which ensures other workers sharing the workshop are isolated from dust exposure. However, she is not able to isolate herself (or potentially others working outdoors) from exposure. She considered it not reasonably practicable to implement any of the other prescribed controls above because she:

- undertakes processing of a CSS for a short duration (10-20 minutes at a time) and infrequently (5 times a week), and
- conducts the work outdoors in an area with good ventilation.

As a result, to ensure the processing of a CSS is controlled, Marcella and any other person who is at risk of exposure to respirable crystalline silica must:

- be provided with appropriate respiratory protective equipment, and
- wear the respiratory protective equipment while the work is carried out.

Considering the requirements of AS/NZS 1715:2009, Marcella decides that a P2 filtered mask that complies with the requirements of AS/NZS 1716:2012 is appropriate. Marcella ensures that her mask is fit-tested, and that she is trained in how to use, store and maintain the respirator.