

Australian Good Practice Guide for fabrication of engineered quartz surfaces

Steps to Avoid Health Hazards Related to Crystalline Silica Dust

Produced by: Australian Engineered Stone Advisory Group

This Guide includes health and safety information and recommendations. However, this Guide is brought to you as a public service and it does not serve as professional advice, nor does it replace any stonemason's personal responsibility to be familiar and strictly comply with health and safety regulations and standards and fully implement all relevant health and safety measures. In case of contradiction between any of the content in this Guide and the content of the health and safety regulations that apply in your state or territory you must follow the latter. To protect the health and life of all workers exposed to crystalline silica dust, it is always necessary to consult with a local occupational health and safety advisor. This Guide shall not be construed in any way or fashion so as to impose liability on the Australian Engineered Stone Advisory Industry Group.

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1. INTRODUCTION

Engineered quartz surfaces are a high-quality, advanced solution for countertops, vanity tops, flooring, wall cladding and other internal applications. They are manufactured from approximately 90% inorganic (rock sourced) material (such as quartz/silica sand, cristobalite, feldspar, glass and mirrors) and high-quality polymer resins and pigments.

As finished product quartz surfaces do not present any type of health risk or hazard when transported, shipped or used by the end consumer. However, dust derived from manufacturing processes such as, among others, cutting, grinding, chipping, sanding, drilling, polishing, etc., whether at the fabrication workshop or upon installing and demolishing products, contains respirable crystalline silica (SiO₂). Hence, workers involved in fabrication processes are at risk for significant crystalline silica exposure. Unprotected workers who inhale very small crystalline silica particles are at risk for silicosis - an incurable, progressively disabling disease which may be fatal.

There has been a rise in reported cases of silicosis amongst Australians fabricating quartz surfaces or working in industries that expose them to silica dust. This has prompted action by some Australian state regulators to review safety advice and regulations as well as calls for a national approach to protecting affected workers.

Employers should be aware of their legal obligations to follow the safety guidelines regulated in their state or territory. Failure to do so equates to an unacceptable health risk in the work place and exposes employers to potential legal action.

This Good Practice Guide provides information on current best practice but makes no claim to be exhaustive and does not replace the health and safety regulations that apply in each state or territory.

2. GENERAL PREVENTION PRINCIPLES

Silicosis and other diseases associated with silica dust can be prevented by implementing the required safety precautions, including those described below.

These protective measures should meet or exceed those contained in laws and regulations that apply in your state or territory regarding working in environments containing harmful dust.

Please note that the recommendations with respect to the work area relate mainly to the production/fabrication facilities but may also relate, under certain circumstances, to the adjacent offices and installation areas.

3. SILICA CONTROL PROGRAMME

In order to control and prevent the health risks associated with crystalline silica, a Silica Control Programme must be developed and implemented in the workplace in accordance with all the applicable local and national laws, regulations, orders and directives. The Silica Control Programme should include the below:

- Identifying the tasks that involve exposure to respirable crystalline silica.
- A description of the engineering controls, work practices, and respiratory protection used to limit employee exposure to respirable crystalline exposure for each task.
- A description of the housekeeping measures used to limit employee exposure to respirable crystalline silica.

The Silica Control Programme should be reviewed and assessed on a regular basis, at least annually, and updated as necessary. Furthermore, you must assess and ensure that occupational exposures to airborne crystalline silica dusts are below the Permissible Exposure Limit (PEL) established by your state or territory regulations. You should consult with a local occupational safety and health consultant regarding assessing employee exposures to crystalline silica and ensure that those exposures are below the mandatory and recommended PEL in your state or territory.

The employer and owner of the fabrication and installation facility must train their employees on the health risks associated with crystalline silica and how to properly protect themselves from exposure. Additionally, facility owners and managers must implement the health and safety measures recommended in this Guide and required by local and national laws to protect their employees from exposure to crystalline silica and to provide a safe and healthy workplace. It is the responsibility of the employers and the employees to adhere to all safety instructions and PPE requirements. Access to the work area should be restricted to authorised workers only and signs should be posted warning of exposure to crystalline silica. By a joint effort of the employer and workers, the workplace can become a safer environment for everyone.

CNC Machine and Wet Tools

One way to prevent exposure to dry crystalline silica dust is to use CNC machines and wet tools. Therefore, where possible, implement fabrication techniques in which all cutting, grinding and shaping is performed by CNC machines and/or wet. Water should be applied at flow rates sufficient to minimize the release of visible dust.

- Operate wet tools and cutting machines as they help to prevent the release of crystalline silica dust. This applies to both manual and automated tools.
- Work with electrical systems designed by professionals to ensure safety when working with wet tools. Control and maintain all water systems in perfect working order according to supplier instructions. Take precautions to handle freezing in unusually cold weather.
- Clean and maintain all drainage systems when using water sprays and hoses.
- Wet hosing should be used for clean-up and in no circumstances should dust be swept up with a broom or removed using compressed air.

Filter (Exhaust) Systems

A second type of engineering control is to use local ventilation and filtration systems specifically designed to collect respirable particles in the dust at their source, as detailed below. Implement filter systems that include the following elements:

- Professional extraction hoods
- Enclosure for collecting and containing pollutants
- Ducts for pollutants removal
- Filters positioned between the hood and the fan
- Fans for moving air flow and releasing clean air outside the workplace.

Ventilation

Recommendations regarding proper ventilation include the following:

- Ensure that the workplace (including the fabrication facilities, as well as the adjacent offices and installation areas) have complete and effective ventilation.
- For local exhaust ventilation, dust extraction and pollution control equipment, work only with professional ventilation suppliers who employ qualified engineers for project execution.
- Position the work area as far away as possible from doors, windows and passages in order to stop wind and draught from spreading the dust and hindering local exhaust ventilation.
- Operate local exhaust ventilation at the dust source in order to capture the dust.
- Connect local exhaust ventilation to a dust extraction unit such as a bag filter/cyclone.
- Maintain local exhaust ventilation in good working order per the supplier's instructions.
- Keep the dust source as tightly closed as possible to prevent dust dispersal.
- Ensure a constant supply of fresh air into the work area to replace extracted air.
- Release extracted air to a safe place away from doors and windows.
- Replace filters or other parts according to supplier's instructions.
- Keep air ducts as short as possible.
- Prevent workers from being exposed to local exhaust ventilation.
- Pay attention to unusual noises from fans that may indicate a malfunction.

We advise that you consult with a ventilation expert or engineer in the design and implementation of ventilation systems to be used in your workplace.

Airborne Dust Monitoring & Supervision

There is only one way to assess airborne crystalline silica concentrations in the work environment; that is, through air monitoring. Exposure assessment and monitoring programmes should include the following:

- Work with occupational health and safety experts to establish air sampling strategies, to perform exposure assessments to assess airborne concentrations of respirable crystalline silica and to ensure respirable crystalline dust exposures are below local or national Permissible Exposure Limits (PEL) and/or Threshold Limit Value (TLV). Air sampling and analysis should be conducted in accordance with well-established sampling and analytical methodologies.
- Implement changes in processes and procedures as necessary to maintain exposures below recommended concentrations. Communicate the air sampling results to employees.
- Ensure that all dust extraction emissions comply with local environmental rules.
- Perform regular inspections of the engineering controls to ensure that the dust intake, filtration and expulsion systems are functioning correctly.
- Ensure that settled and airborne dust cannot be dispersed or spread to clean areas or outside the work area.
- Select wall tiles and flooring surfaces that are hermetically sealed and easy to clean.
- Display a sign in all areas with hazardous dust concentrations. The sign should read:

DANGER

RESPIRABLE CRYSTALLINE SILICA MAY CAUSE CANCER AND CAUSES DAMAGE TO LUNGS

WEAR RESPIRATORY PROTECTION IN THIS AREA

AUTHORISED PERSONNEL ONLY

- Create and enforce rules for all workers to wear protective respiratory equipment in areas where hazardous dust exposure may occur (as further detailed below).
- Convey to workers in charge of dust supervision the importance of setting a good example on the floor.

We advise that you consult with occupational safety and health professionals or other appropriate experts in implementing the foregoing recommendations, such as creating airborne dust monitoring systems, dust extraction, selection of suitable wall tiles and flooring, and displaying warning signs.

Workers must use appropriate respiratory protection and other PPE. You should consult with an occupational health and safety professional to develop programmes, policies and procedures for the use of PPE, specifically respiratory protection.

General Personal Protective Equipment

PPE is mandatory in workplaces where health and safety hazards exist. These areas should be clearly marked with appropriate signage.

All PPE provided to your workers must meet regulatory standards for design, manufacture, use and limitations. This PPE includes eye protection, skin protection, head protection, hearing protection, foot protection and respiratory protection. Workers should receive training on the selection, adaptation, use and maintenance of the required PPE.

Ensure that all workers use appropriate PPE.

Keep records of all PPE in use.

Provide clean storage facilities for PPE when not in use.

Respiratory Protective Equipment

You should consult with an occupational health and safety professional to develop a respiratory protection programme that adheres to state or territory regulations. The occupational health and safety professional should also determine the appropriate type of respiratory protection to be used based on the airborne respirable crystalline silica concentrations found in your workplace.

Workers should receive training on the selection, adaptation, use and maintenance of the required respiratory protection. Additionally, they

should check the efficacy of all respiratory protection equipment before use and clean the respiratory protection after use.

Any worker required to wear respiratory protection should be fit tested to ensure that the respirator provides the required protection.

Any worker required to wear respiratory protection should be medically evaluated in order to determine if they are able to wear respiratory protection. You should consult with an occupational health and safety professional to determine the local requirements for this evaluation.

As facial hair can lessen the effectiveness of a respirator, operators with facial hair should work with positive pressure air supplied respirators or other suitable alternatives.

Cleaning

Clean the workplace, floors and all exposed surfaces at least on a daily basis, using wet cleaning or HEPA vacuuming.

Check that the work area is clean at the end of each shift.

Create a regular, recurring schedule for cleaning all equipment and systems.

Employ both wet and HEPA vacuum cleaning methods.

Provide ample vacuum connection points for a central vacuum cleaning system.

Provide ample water connection points for wet cleaning techniques.

Use vacuum cleaning systems for dry spillage only.

Use only dry cleaning with brushes when wet cleaning or vacuum cleaning is not possible.

Clean wet or dry spillage immediately; never wait for the end of day clean-up.

Do not allow dust and debris to dry out before cleaning.

Do not sweep with a dry broom, brush or use compressed air.

Do not clean work clothes, machines or floors with compressed air.

Hygiene

Personnel hygiene is another important factor in health protection, and includes the following:

Provide bathroom facilities in the plant with toilets, showers, wash basins and individual lockers for storing changes of clothing. Make two checkrooms available to all plant workers: one in which they change from home clothes into clean work clothes and store their home clothes during working hours; and another in which they change out of work clothes at the end of a working day before showering and changing back into home clothes.

Workers should wear only designated work apparel at the worksite, including footwear and socks. Workers should leave their work clothes and shoes in the workplace and never remove them from the plant.

Launder all workers' working clothes and provide them with clean clothes each day.

Provide explanations on the importance of separating work clothes from clean clothes.

Workers should wash their hands and face, and change clothes before eating, drinking, and/or smoking.

Permit eating, drinking and smoking only in designated areas that are not exposed to hazardous dust.

Administration, Regulation & Maintenance

Maintain all equipment in good working order.

Do not make changes to any working systems without supplier approval.

Keep user instructions and diagrams of installed systems in a safe place for reference.

Ensure that regular inspections are performed on inlet airflows, duct air speed and the filter pressure index on ventilation systems.

Check all systems at least once a week or according to supplier instructions.

Keep inspection reports for the period of time required under local laws.

Installing Quartz Surfaces

In order to protect installers from working in an unprotected environment, all surfaces should be fabricated in the plant and not at the end user's location.

If the surface needs any grinding or other dust-producing modifications at the installation site, use of wet methods in an outdoors area is recommended.

If an outdoors area is not available, cutting or grinding equipment that has an integrated dust collector with a HEPA filter should be used. The local heating/air-conditioning system should be shut down and sealed off.

After completing an installation, thoroughly clean the work surface and remove all dust using wet methods and a HEPA filtered vacuum cleaner.

All work should be performed with the appropriate respiratory protection against silica dust (as detailed above), along with eye, ear and skin protection.

Training Workers on Safety and Hygiene Issues

One of the keys to creating a safe work environment is providing ongoing training to workers at all levels on safety issues that are specific to their workplace. The more workers are involved in and aware of the safety programme/policies/procedures of the workplace, the more likely they are to comply with them. Health and safety training for all workers should be performed on a regular basis, at least annually.

Workers' training should include the following:

Provide clear information about the health risks associated with exposure to crystalline silica and the tasks that could result in those exposures.

Provide clear information about the specific measures that have been employed to protect employees from exposure to respirable crystalline silica, such as engineering controls, safe work procedures, and PPE, including respiratory protection.

Provide clear guidelines for safe working programmes, policies, procedures and work practices at your workplace.

Provide training on the use of PPE and on appropriate hygiene procedures.

Provide the employees with the purpose and description of the medical surveillance programme.

Attendance at training sessions should be compulsory. Ensure that new workers attend the health and safety training sessions before commencing any work. Continue delivering training sessions to existing workers on an ongoing basis.

Assess workers knowledge in order to verify that they understand the training material.

Refresher training sessions should be provided to keep workers up to date on health and safety hazards, policies and procedures and should be in accordance with the local regulations.

Safety issues and requirements can vary over time. It is important to ensure that your safety programmes and associated training incorporates these changes.

Keep records of workers' attendance at training sessions, the dates of those training sessions, and the training material provided to workers.

Encourage employee feedback in order to improve future training sessions.

Medical Surveillance

Medical surveillance should be implemented based on your state or territory regulations. You should consult with an occupational health and safety professional to establish your specific medical surveillance programme requirements, which may include the following:

Implement a medical surveillance programme for workers who are exposed to respirable crystalline silica and who are required to wear respiratory protection, including medical examinations and other tests as required by regulations.

Medical examination and surveillance may include a physical examination, along with a medical and work history review, a chest x-ray, a pulmonary function test, and other tests that may be deemed medically necessary.

Maintain records of the medical surveillance of your workers in accordance with applicable laws and regulations. A copy of the medical surveillance report must be provided to your employees.

DISCLAIMERS

This Guide includes health and safety information and recommendations. However, this Guide is brought to you as a public service and it does not serve as professional advice, nor does it replace any stonemason's personal responsibility to be familiar and strictly comply with health and safety regulations and standards and fully implement all relevant health and safety measures.

The information contained in this Guide is current and accurate according to the best of our knowledge. However, it is only a summary; it is not possible in this short document to comprehensively cover all the topics mentioned, nor is it possible to cover in detail all areas of concern regarding crystalline silica dust in the workplace.

Furthermore, any recommendations or suggestions made here are general and do not take into account the specific conditions that exist at each Fabrication Process site.

None of the content in this Guide may be construed as a recommendation for using any product or tool in violation of any laws, safety practices or other applicable terms.

We recommend that you also consult with occupational health professionals and other experts concerning all matters regarding control of respirable crystalline silica in each specific workplace.

Please note that the laws and regulations regarding silica dust differ between jurisdictions and you are required to check and comply with your local regulations and legislation regarding working in environments containing harmful dust. In any case where these guidelines contradict your local regulations, your local regulations shall take precedence.

None of the information contained in this Guide creates a contractual relationship between the Australian Engineered Stone Advisory Group and any stonemason or distributor nor shall it be construed in any way or fashion so as to impose any kind of other liability on the Australian Engineered Stone Advisory Group.

4. QUESTIONS & ANSWERS

1. What are silica and quartz?

Silica is one of the most common compounds on earth. Silica is composed of two elements: silicon and oxygen. Its chemical name is silicon dioxide (SiO₂).

Silica is found in nature in various forms, mainly as sand, and also as rocks and stones such as marble, granite, quartz and cristobalite. Silica is a component of many manufactured products in daily use, such as glass, pottery and quartz surfaces. Silica is very commonly used in construction and at various concentrations in bricks, blocks, tiles, slabs, cement and concrete.

2. What are engineered quartz surfaces?

Engineered quartz surfaces are an advanced solution for kitchen countertops, bathroom vanities, flooring, wall cladding and other internal applications. They are manufactured from approximately 90% quartz and high-quality polymer resins and pigments.

Manufactured quartz surfaces are in use today in millions of homes around the world, and in many environments that require the strictest standards of cleanliness and sterility, such the Starbucks Coffee chain in the USA and Canada; the McDonald's chain in Australia; and numerous restaurants around the world.

3. What is respirable silica dust and why is it dangerous?

Fabricating materials that contain quartz generates silica dust particles. Part of the silica dust contains small particles which are "respirable" - that is, breathable - and are tiny enough to bypass the body's defences and enter the lungs. This can cause irreparable damage to the lungs and can result in silicosis (see below).

4. What is silicosis?

Exposure to respirable crystalline particles of a very small size (less than 10 microns) may cause silicosis, an incurable, progressively disabling and sometimes fatal lung disease. Silica dust particles become trapped in lung tissue, causing inflammation and scarring and reducing the lungs' ability to take in oxygen.

Symptoms of silicosis can include progressive shortness of breath, cough and fatigue. Safety measures including wet processing and the use of effective respiratory protection will reduce the burden of inhaled dust and can prevent the disease.

5. Can crystalline silica dust hazards be prevented?

Yes. Exposure to crystalline silica dust and the related risks that may result from such exposure can be reduced and controlled if the proper safety measures are implemented. These measures include, among others, installing proper engineering controls (ventilation and filtration), working with CNC machines and water-injected tools, and using appropriate respiratory protection. You must assess and ensure that occupational exposure to airborne crystalline silica dust is below the Permissible Exposure Limits established by government regulation. Always apply your local laws and regulations regarding working in environments containing harmful dust.

6. Who is responsible for ensuring the health and safety of workers?

The employers of stonemasons are responsible for the health and safety of their employees in all matters related to work in their plants. Plant owners, managers and workers must implement all the required health and safety requirements, which include, among others, air monitoring, use of proper work procedures, engineering controls and PPE, to ensure workers are properly protected from exposure to silica. The employer and the owner of stone fabrication plants are responsible for providing the workers with all the training, warnings, information, tools and safety means required to protect them from the dangers of exposure to crystalline silica dust and for enforcing the implementation of all safety means by the workers. The workers are responsible for fully implementing the safety instructions. By a joint effort of the employer and workers, the workplace can become a healthy environment for everyone.

7. Can engineered quartz surfaces at home be harmful to the consumer after installation?

Absolutely not. Engineered quartz surfaces are completely safe for domestic use.

8. Can engineered quartz surfaces be harmful during installation or repair in the consumer's home?

The health risk lies in the processing procedure of the slabs, if not performed in accordance with health and safety legal requirements. The professional performing these processes should possess the knowledge and tools to protect him or herself from the silica dust. As in every place where professional technical work is carried out, no person other than the professional technician should be present near the working area during the performance of this work.

9. Do engineered quartz surfaces meet industry standards for health and environment?

Engineered quartz surfaces maintain the most stringent industry standards for health and environment that apply in Australia and other countries where the products are available.