



Protecting workers from exposure to Respirable Crystalline Silica (RCS)

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Regional Offices

Introduction



Photo 1 - Wet polishing of engineered stone



Photo 2 - PPE/RPE examples in stone fabrication

Stone benchtops, stone cladding and similar products are made from natural or engineered stone. Engineered stone products can contain up to 95 per cent crystalline silica whereas a natural stone such as granite may contain from 20 to 60 percent.

There are serious health risks caused by exposure to respirable crystalline silica (RCS) when cutting, grinding, sanding and polishing stone benchtops and other stone products.

Just because you don't see dust, it does not mean you are safe. When there is visible dust, workers are at risk. Even when there is no visible dust, workers may be at risk due to exposure to microscopic dust particles of crystalline silica, called the 'respirable fraction' which can lead to a range of serious and potentially fatal respiratory diseases.

Health monitoring of workers in the stone benchtop industry in Australia has found many cases of workers suffering silicosis.

Silicosis is a serious and irreversible lung disease that causes permanent disability and early death. 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 shortness of breath, cough and fatigue. Silicosis can result from exposure to RCS over many years, but very high short-term exposures can cause it to develop rapidly. There is no effective treatment for silicosis.

Workers exposed to RCS are also at increased risk for chronic obstructive pulmonary disease (COPD), kidney disease and lung cancer.

Research done in Australia and overseas has found that RCS was not adequately controlled even when wet methods of fabrication were used. Whilst wet work methods significantly reduce airborne silica dust, there may still be RCS dust in the air. Applying water to rotating tools may cause RCS contaminated water mist to be generated. These water droplets may disperse onto surfaces and tools, dry out and potentially become an inhalation risk. Therefore controls to limit uncontrolled overspray are recommended.

Quick reference – Summary RCS hazard management



Identify workers exposed to RCS



Information and training has been provided



Health surveillance is provided where there is a risk



Risk assessments have been conducted

- | | |
|--------------------------|--|
| <input type="checkbox"/> | Workers or others exposed to RCS during fabrication or installation of stone bench tops have been identified. |
| <input type="checkbox"/> | Workers have been provided with information and training on RCS, including potential health effects, the need for health surveillance, appropriate control measures and how to use the control measures. |
| <input type="checkbox"/> | Health surveillance is provided to all stone workers and to other workers where there is a risk to health from exposure to RCS. |
| <input type="checkbox"/> | Safe operating procedures have been developed and implemented for stone fabrication and installation work. |
| <input type="checkbox"/> | Risk assessments have been conducted and recorded for RCS and other hazardous substances in the workplace. |
| <input type="checkbox"/> | Safety Data Sheets (SDS) are available at the workplace for all hazardous substances used in the workplace, including those containing silica. |
| <input type="checkbox"/> | Effective control measures have been implemented, including; <ul style="list-style-type: none"> • No dry cutting, grinding or polishing • Wet work methods <ul style="list-style-type: none"> ○ Wet spray is controlled to prevent it becoming airborne ○ Wet waste is contained so that it does not later dry out and present an inhalation hazard • Local extraction ventilation (LEV) is used on cutting and grinding equipment <ul style="list-style-type: none"> ○ A safe system of work is in place for cleaning and maintenance of LEV, to prevent exposing workers to RCS • Regular thorough housekeeping system is in place <ul style="list-style-type: none"> ○ HEPA filtered vacuum cleaner (class M or H) used ○ No dry sweeping ○ No use of compressed air to clean persons or surfaces ○ No dust build up on surfaces within the workplace |
| <input type="checkbox"/> | Effective respiratory protective equipment (RPE) has been provided and is always used in RCS work areas. <ul style="list-style-type: none"> • For example, use a powered air purifying respirator (PAPR) or a reusable half face respirator with a P2 (particulate) cartridge, meeting the requirements of AS/NZS 1716 and selected and used in accordance with AS/NZS 1715. |
| <input type="checkbox"/> | Workers are clean shaven if using a fitted respirator. |
| <input type="checkbox"/> | RPE fit testing, fit checking, maintenance and storage is conducted in accordance with AS/NZS 1715. |
| <input type="checkbox"/> | Appropriate PPE such as disposable overalls, aprons, goggles, safety waterproof boots and hearing protection is provided and is worn at all times in areas where exposure to the hazard may occur. |
| <input type="checkbox"/> | Risks associated with contaminated surfaces and clothing are managed, ie: <ul style="list-style-type: none"> • Contaminated clothing is not taken into lunchroom. • Best practice - contaminated clothing is laundered at the workplace or as a minimum vacuumed and dampened prior to taking home to wash. <p>Workers wash face, hands and forearms prior to accessing amenities/lunch areas, taking meal breaks or going home.</p> |
| <input type="checkbox"/> | Best practice - Workers shower before leaving work. |
| <input type="checkbox"/> | Processes where RCS is generated are isolated from other workers, such as by using physical barriers between different work processes and work areas. |
| <input type="checkbox"/> | Consideration has been given to selecting materials with a low percentage of crystalline silica content. |

RCS information, training, instruction



Information and training has been provided



Records of information, instruction and training is maintained

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- Workers who may be exposed to hazardous substances including RCS are provided with adequate information, instruction and training.
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- Information, instruction and training includes:
- Information about RCS and the risks to health from exposure;
 - Control measures at the workplace;
 - Safe work practices and procedures to be followed, for example for handling, processing, storing, transporting, cleaning up and disposing of stone slabs, dust and slurry.
 - Selection, correct use, maintenance and storage of respiratory protective equipment (RPE) and personal protective equipment (PPE) required to control risks and the limitations of the PPE; and
 - Health surveillance requirements.
-
- Records of information, instruction and training in relation to RCS are maintained.
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Consultation

Consultation and co-operation between employers and workers is the key to providing and maintaining a safe and healthy workplace. Consultation assists in finding practicable solutions to problems and ensuring employees have buy-in to the solution.

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- Employer consults with their OSH representatives (where applicable) and other workers about minimising the risks associated with RCS.
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- Workers are involved in identifying hazards and assessing and controlling the risks.
-
- Workers are consulted on health and safety matters relating to RCS including:
- managing risks of RCS exposure;
 - making changes to processes or procedures that generate RCS;
 - making changes to controls to protect workers from RCS;
 - providing health surveillance to workers exposed to RCS;
 - monitoring the conditions at the workplace; and
 - provision of information and training for workers.
-

Wet work methods - Cutting, grinding and polishing stone

Prohibit uncontrolled dry cutting, grinding or polishing

Dry cutting, grinding or polishing stone without water suppression or local exhaust ventilation generates very high levels of dust containing RCS. These levels can exceed the capabilities of half face air purifying respirators.

Engineering controls must be implemented.

Do not use power tools without either water suppression or dust extraction fitted to the tool.



Use tools designed for use with water attachments



Do not cut without the saw being water fed



Use respiratory protective equipment



Use local extraction ventilation



Only use tools with water dust suppression or dust extraction

Wet work methods

Workers can still also be exposed to RCS from wet grinding and polishing processes and poor cleaning practices.

- Tools and machinery used at the workplace are designed for use with water attachments.
- Adequate number of water feeds are directed at the material and/or tool to prevent visible dust during the process.
- Adequate water pressure is used, to ensure water reaches the material and/or tool.
- Water spray from tools/machinery is controlled (to prevent it from becoming airborne) using guards, plastic flaps or brush guards.
- Water suppression systems are not turned down or off during operation.
- Bridge saws are fitted with water attachments to suppress dust when cutting slabs.
- Water suppressed routers, water jet cutters or bridge saws are used to complete sink and stovetop cut outs.
- Hand-held angle grinders are designed for wet use and fitted with multiple water feeds to deliver water to the cutting disc and point of contact with the stone.
- Water suppressed wet-edge milling machines or polishing machines are used.
- Polishers have a centre water feed.
- Adequate floor drainage is installed where wet processes are done.
- Slurry or residue from wet cutting and polishing activities is regularly cleaned up to prevent it accumulating.
- Waste water recycling system is regularly maintained/serviced.
- Best practice – Use finer filters (eg <math><5\mu\text{m}</math>) to reduce the silica content in recycled water.

Engineering controls

Ensure adequate ventilation and extraction are used to reduce exposure to RCS



No uncontrolled dry cutting, grinding or polishing



Local exhaust ventilation is used on cutting or grinding equipment



LEV is serviced and maintained



Workers are trained in correct use

Dust suppression and ventilation

-
- No uncontrolled dry cutting, grinding or polishing of engineered or natural stone products.

 - Equipment and tools are fitted with dust suppression, ie water spray or local exhaust ventilation (LEV) (Best practice: Use both).

 - Local exhaust ventilation (LEV) is used on cutting or grinding equipment. The LEV should
 - Be part of the equipment design eg CNC machines
 - Be fitted to the individual equipment where dust is generated
 - Include H or M class dust filters
 - Use designed hoods or extraction machinesDust suppression/capture equipment is always used.

 - LEV is regularly serviced and maintained.

 - LEV servicing does not expose workers to RCS.

 - Workers have been trained in how to correctly use dust suppression equipment.

 - Pneumatic tools and machinery have been specifically designed for local exhaust ventilation attachments (to ensure adequate dust capture).

 - Hand tools, for example drills, circular saws, grinders, are equipped with LEV including a shroud and an M or H class HEPA filter, or if designed for wet use are fitted with water feed.

 - LEV capture velocity is adequate to capture RCS.

Safe work practices and isolation of workers from RCS



Slabs are wet before cutting, grinding or polishing



Adequate distance between the work processes



Dusty clothes are washed or vacuumed at the workplace

Work practices to reduce exposure to respirable crystalline silica (RCS)

- Slabs are wet before cutting, grinding or polishing to aid with dust suppression.
- Excess water generated from water suppressed processes through curbing and channelling is captured/drained.
- The workplace design and systems of work prevent water pooling on surfaces and leaving dry dust deposits after evaporation.
- Workers wash hands and face thoroughly before eating, drinking or leaving the workplace.
- Dusty work clothes are washed or vacuumed at the workplace, or washed at a commercial laundry, to avoid taking them home dusty.
- Workplace is cleaned using low pressure water, wet wiping or a HEPA vacuum (Class M or H).

Isolate workers from RCS dust generating processes

- Adequate distance between the work process (eg bridge saw, router) and the worker.
- Adequate distance between workers using powered hand tools and other workers at the workplace.
- Physical barriers between workers and workstations used to prevent the water mist moving into other work areas or towards other workers.
- Separate clean amenities room or area away from the fabrication area is provided for food preparation and eating.
- CNC (computer numerically controlled) machinery used for stone process. CNC uses water to cut and polish stone, reduces worker manual cutting tasks, wet process reduces dust in workplace.
- Dust from dry cutting processes is cleaned up using a HEPA vacuum (Class M or H). Cleaning must include all areas where silica dust can settle e.g. Storage areas, yard, shelving.

Substitution

- Consider using materials with a low percentage of crystalline silica content.
- Choose routers and water cutters instead of powered hand tools.

Respiratory Protection Equipment (RPE)

Unless the workplace has undertaken air monitoring to demonstrate there is no risk from RCS, for example RCS levels consistently less than 0.02 mg/m³ at a 95% confidence level (which research shows is unlikely), an RPE program that complies with AS/NZS 1715 must be implemented.

The program must include: provision of suitable and comfortable RPE, fit checking, maintenance and repair, training and guidance to workers. AS/NZ 1715 requires fit testing by a competent person for close fitting respirators, using either a qualitative or quantitative method. Fit testing should be conducted for half face disposable, reusable or full face respirators and fitted PAPR. Beards and facial hair prevent the wearer from obtaining a good seal between their face and a close fitting respirator. Fit testing should be conducted when workers use a new respirator or the wearer's facial characteristics change (ie.weight loss or gain).

A fit check is a quick check to ensure the respirator, which has been fit tested, has been properly positioned on the face and there is a good seal between the respirator and face. The wearer should do a fit check each time they put on a respirator. Fit checks do not replace the need for a fit test.

Best practice – Workers are supplied with powered air purifying respirators (PAPR), which are comfortable and provide high level protection.



Appropriate RPE selected and provided



Workers are trained in correct use

- | | |
|--------------------------|--|
| <input type="checkbox"/> | Workers are provided with appropriate RPE for individual use. |
| <input type="checkbox"/> | RPE is chosen in consultation with workers and with consideration to hot/humid work areas. <ul style="list-style-type: none"> • PAPR are cooler to wear than air purifying respirators. |
| <input type="checkbox"/> | Workers wear RPE whenever they are conducting dust generating processes at the workplace or during on-site installation. |
| <input type="checkbox"/> | RPE is selected in accordance with AS/NZS 1715, for example a reusable half-face respirator with a P2 filter or preferably a powered air purifying respirator (PAPR). |
| <input type="checkbox"/> | Workers required to use RPE are trained by a competent person, including the following aspects: <ul style="list-style-type: none"> • why RPE is required; • when RPE is required to be worn; • how RPE works; • the limitations of RPE; • how to correctly put on and take off RPE; • how to conduct a fit check; • how to clean and maintain RPE; • when and how to replace filters; and • how and where to store RPE when not in use. |
| <input type="checkbox"/> | Workers required to wear close fitting RPE are clean shaven. <ul style="list-style-type: none"> • Alternatively, workers with facial hair are provided with suitable RPE (eg hood style powered air purifying respirator PAPR) |
| <input type="checkbox"/> | RPE is maintained in efficient working order and cleaned before and after use in accordance with the manufacturer's instructions. |
| <input type="checkbox"/> | RPE is stored in a place where it will not be contaminated (eg an airtight container) when not in use. |
| <input type="checkbox"/> | A medical assessment has been conducted for workers with certain medical conditions eg chronic lung conditions (emphysema, silicosis or asthma), circulatory diseases (heart disease or anaemia); epileptic seizures or psychological factors. |
| <input type="checkbox"/> | Workers using fitted respirators have had a fit test. |
| <input type="checkbox"/> | Workers using fitted respirators conduct fit checks prior to each use. |

Air monitoring



Air monitoring has been conducted



Results of air monitoring is communicated to staff

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- | | |
|--------------------------|--|
| <input type="checkbox"/> | Air monitoring has been conducted if indicated as part of workplace risk assessment. |
| <input type="checkbox"/> | Results of air monitoring have been communicated to employees. |
| <input type="checkbox"/> | If air monitoring shows exposure standards have been exceeded, control measures have been reviewed and improved. |
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Laundry, amenities and housekeeping



Dusty clothes are washed or vacuumed at the workplace



Use low pressure water, or wet sweeping to clean



Facilities to wash face and hands

Laundrying

Best practice: provide laundry facilities, eg a washing machine at the workplace, or contract laundry services to a company that specializes in contaminated clothing.

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- | | |
|--------------------------|--|
| <input type="checkbox"/> | Workers do not take dry dusty/contaminated clothing home. |
| <input type="checkbox"/> | After each shift, workers change their clothing |
| <input type="checkbox"/> | Workers' clothing is at least vacuumed using a M or H class HEPA-filtered vacuum before they go home, or (preferably) washed on site.

Dirty clothing is vacuumed or dampened if laundrying at home, for example taken home damp in a bucket with a lid. |
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Cleaning and housekeeping

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- | | |
|--------------------------|--|
| <input type="checkbox"/> | Daily thorough cleaning procedures to remove water slurry and settled dust are in place. |
| <input type="checkbox"/> | Low pressure water, wet sweeping or a M or H class rated vacuum cleaner with a HEPA filter are used to clean floors, walls and other surfaces.

Vacuum manufacturer's operator's manual is referred to for changing dust bags and filters. |
| <input type="checkbox"/> | Vehicle track or high use areas are cleaned frequently and kept damp during the day. |
| <input type="checkbox"/> | Dry sweeping is prohibited.
Do not use compressed air to clean surfaces or clothing as this practice is prohibited. |
| <input type="checkbox"/> | Water hoses are provided for cleaning between tasks. |
| <input type="checkbox"/> | Wet slurry is placed inside a sealed container/bin awaiting disposal, and is handled by workers wearing PPE and RPE. |
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Amenities

-
- | | |
|--------------------------|--|
| <input type="checkbox"/> | Workplace facilities are provided, cleaned regularly and maintained. |
| <input type="checkbox"/> | A hand basin is available near the work area to wash face and hands. |
| <input type="checkbox"/> | Best practice – prior to meal breaks and entering lunch room/amenities areas <ul style="list-style-type: none">• workers wash hands and face• workers remove or vacuum dusty clothing and remove work boots |
| <input type="checkbox"/> | Seating is provided and maintained. |
| <input type="checkbox"/> | Smoking is not permitted in enclosed workplaces. |
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Health surveillance – Respirable crystalline silica



Health surveillance is supervised by an Appointed Medical Practitioner



Health surveillance is conducted before commencing employment as well as at regular intervals

If the health of a person is at risk as a result of the person's exposure at a workplace (including installation site) to RCS the employer must provide health surveillance at no cost to the person.

Recent air monitoring conducted in Australia has shown that health surveillance is generally required in all stone bench top fabrication workplaces.

- | | |
|--------------------------|---|
| <input type="checkbox"/> | Health surveillance is supervised by an Appointed Medical Practitioner (AMP), (a doctor with experience in RCS health surveillance, appointed by the employer in consultation with employees). |
| <input type="checkbox"/> | Health surveillance is provided before a worker starts work to establish a baseline from which changes can be detected. |
| <input type="checkbox"/> | Periodic health surveillance is provided at intervals recommended by the AMP. |
| <input type="checkbox"/> | Health surveillance is provided when a person leaves employment at the workplace. |
| <input type="checkbox"/> | The employer receives the outcome of health surveillance and details of any remedial action required, from the AMP. |
| <input type="checkbox"/> | Controls are reviewed if health surveillance has found employees have health effects from RCS exposure or as recommended by AMP. |
| <input type="checkbox"/> | Employer provides workers with information about the purpose of health surveillance. |
| <input type="checkbox"/> | The AMP gives workers a copy of their health surveillance results. |
| <input type="checkbox"/> | The employer pays the costs of: <ul style="list-style-type: none"> • health surveillance, including the costs of the medical services provided; • the costs of travel and wages of the worker for the duration of these appointments. |

On site installation of bench tops



Workers have been trained



Use respiratory protective equipment



Work is done outdoors or in well ventilated areas



A HEPA-filtered vacuum is used to clean up dust

- | | |
|--------------------------|---|
| <input type="checkbox"/> | Workers conducting installation work on site are provided with adequate information and training, to reduce the risk, protect their own health and not put others at risk from exposure to RCS. |
| <input type="checkbox"/> | When cutting or grinding on site: <ul style="list-style-type: none"> • work is done outdoors or in well-ventilated areas; • electric or air powered tools that are designed to be used with water suppression or tools fitted with extraction eg. dust shrouds coupled with a HEPA filtered vacuum (class M or H) are used; • a HEPA-filtered vacuum (class M or H) is used to clean up dust as soon as practicable; and • workers wear a reusable half-face respirator with a P2 filter or preferably powered air purifying respirator PAPR. |

Noise



Noise assessment has been conducted



Control measures have been put in place



Hearing protection has been provided and used



Workers have received information and training

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- A noise risk assessment has been conducted.
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- Where practicable, control measures have been put in place to reduce the risk of hearing loss where noise levels exceed 85 dB(A).
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- Hearing protection has been provided to workers and is used.
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- Workers have received information and training in relation to noise at the workplace and the use of hearing protection.
Note – some hazardous substances are ototoxins – these chemicals can contribute to hearing loss.
-
- Workers have been instructed on the selection, fitting, use, testing, maintenance and storage of personal hearing protection.
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- Best practice - Audiometric testing has been provided
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- Signage for PPE is present at the workplace in accordance with AS 1319.
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Manual tasks



Identify the manual tasks hazards



Conduct a risk assessment



Provide training

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- Manual task hazards have been identified** in consultation with employees.
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- Risk assessments** of hazardous manual tasks have been conducted, including tasks such as carrying, pushing, pulling, holding and lifting.
-
- Practicable control measures** have been implemented and maintained to eliminate or reduce manual task risk in consultation with employees, such as: altering the workplace environment, design or layout; changing the systems of work; modifying the load being handled; changing the tools used to do the task or using mechanical aids.
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Access/egress, slip, trip or fall, emergency planning and first aid



Ensure the floor is slip resistant



Place warning sign on spills and wet floors



Eradicate trip and fall hazards



Guard rails on ramps and steps



Appropriate footwear is worn

- Site hazards are identified, assessed and controlled.
 - People can move safely around the workplace - passages are kept free of obstructions.
 - Access to and egress from workplace is safe and kept free from obstructions.
 - Lighting is adequate.
 - Evacuation procedures and diagram displayed and practiced.
 - First aid facilities available and first aid trained person available.
 - Warning signs provided.

Guarding of plant



Adequate guarding is in place



Pre operational checklists are used



Lockout tag out procedures in place



Provide training on safety features



Ensure drive belts are guarded

- Every dangerous part of fixed, mobile or hand held powered plant (machinery) is securely guarded.
- Adequate safe work procedures provided and documented to set, test and use machinery during all cycles of production and maintenance. For example pre-operation checks, isolation lock out procedure.
- Operators and maintenance personnel are properly trained and familiar with the operation and set up of the machinery, including safety features.
- Manufacturers' decals, manuals and operator instructions are readily available, and are in English and if required in other languages spoken at the workplace.

Pressure vessels



Pressure vessel registered with WorkSafe



Display registration



Keep inspection records

- Pressure vessels such as air receivers are registered with WorkSafe when the hazard level is A, B or C, according to the criteria set out in AS4343-2005.
- Proof of registration is available at the workplace:
 - the registration number of the item of plant is legibly stamped on the item of plant; and
 - a copy of the evidence of the registration is displayed on or near the pressure vessel.

Electricity

- Electrical installations are installed, constructed, maintained, protected (cover) and tested to minimise the risk of electric shock or fire
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Mobile plant



Plant is well maintained



Prestart checklists are used



High risk work licences are held



Seat belts are worn



Manage the movement of traffic

Forklifts

- Mobile plant is maintained to minimise risks.
 - Log book and pre-start checks are recorded.
 - Operators have high risk work licence.
 - The forklift is in a safe condition - load-chart, operator's manual, seat, seatbelt, tyres, carriage, controls labelled, dangerous parts guarded

Gantry cranes

- Pendant/control buttons labelled.
 - Lifting hooks and safety latches in good condition.
 - Slab lifting attachment in good condition.
 - Evidence of maintenance – daily inspection and annual inspection.
 - Operator's manual available.
 - Maximum rated capacity clearly marked on crane.
 - Operators trained and supervised and do not stand in danger area.
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Safe storage of stone



Store stone slabs safely in A Frame or toaster rack system

- Ensure stone slabs are safely stored in A Frame or toaster rack system.
 - Ensure workers are prohibited from entering Toaster Rack system or identified danger areas whilst stone slabs are being handled/removed.
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