

# ST0

COSHH essentials for stone workers: Silica

## Advice for managers

**The Control of Substances Hazardous to Health Regulations 2002 (COSHH) require employers to ensure that exposure is prevented or, where this is not reasonably practicable, adequately controlled. This guidance gives practical advice on how this can be achieved by applying the principles of good practice for the control of exposure to substances hazardous to health, as required by COSHH.**

**It is aimed at people whose responsibilities include the management of substances hazardous to health at work eg occupational health specialists, anyone undertaking COSHH assessments, and supervisors. It is also useful for trade union and employee safety representatives. It will help you carry out COSHH assessments, review existing assessments, deliver training and supervise activities involving substances hazardous to health.**

**This guidance is issued by the Health and Safety Executive. Following the guidance is not compulsory, unless specifically stated, and you are free to take other action. But if you do follow the guidance, you will normally be doing enough to comply with the law. Health and safety inspectors seek to secure compliance with the law and may refer to this guidance.**

### Introduction

HSE has produced these advice sheets to help employers control health risks from hazardous substances in the workplace.

The ST series of control guidance sheets describe what is expected for controlling exposure to stone dust from processing stone. Information in these sheets applies to anyone carrying out similar activities eg in the construction and quarrying industries.

Stone dust is formed from processing natural and artificial stone, including engineered resin-based stone, eg by cutting, chiselling and polishing. It can contain high levels of respirable crystalline silica (RCS) which is hazardous to health.

The level of RCS in the dust can be estimated from the crystalline silica content in the bulk stone. Crystalline silica may also be known as alpha-quartz, cristobalite or 'free silica', and can be wrongly labelled as 'amorphous silica'.

The approximate content of crystalline silica in some common types of stone and other materials is given in the table below.

Stone and other materials	Crystalline silica content (% w/w)
Sandstone, gritstone, quartzite	above 70%
Artificial stone *	up to 95% (but depends on the type of stone pieces or minerals used in its production)
Mortar, concrete	25 to 70%
Shale	40 to 60%
China stone	up to 50%
Granite	20 to 45% (typically 30%)
Slate	20 to 40%
Ironstone	up to 15%
Basalt, dolerite	up to 5%
Limestone, chalk	up to 5% (typically less than 2%)
Marble	up to 5% (but can contain veins of crystalline silica so overall content may be a lot higher)

\* Artificial stone may also be known as agglomerated stone and includes engineered stone, sintered stone and terrazzo. Resin-based engineered stone often comprises up to around 95% quartz, and about 5% resin (usually polyester), whilst sintered stone, which includes ceramic and porcelain, usually contains around 5-25% crystalline silica.

In addition to stone processing, dust containing RCS from surfaces (including contaminated workwear) and maintenance tasks can also result in significant exposures. Water suppression (dust suppression using water), extraction (also known as local exhaust ventilation (LEV)), personal protective equipment (PPE), and good management arrangements, eg for cleaning and housekeeping, are important to adequately control worker exposure.

### What the sheets cover

The ST series of sheets covers the key points you need to follow to reduce exposure to stone dust containing RCS to an adequate level to protect the health of workers.

ST1	Primary and secondary sawing
ST2	Automated boring and polishing using rotary tools
ST3	Cutting and polishing using hand-held rotary tools
ST4	Hand and pneumatic chiselling
ST5	Sawing slate
ST6	Manual slate splitting
ST7	Dressing slate (edge bevelling)

### Hazards

Crystalline silica dust, which is fine enough to reach deep inside the lung, is known as respirable crystalline silica (RCS). Exposure to RCS can cause silicosis, where irreversible lung damage can be present before any symptoms develop and the risk increases as exposure to dust increases. Silicosis may continue to worsen even after exposure to RCS stops. RCS can also cause other serious diseases such as chronic obstructive pulmonary disease (COPD) and lung cancer. The workplace exposure limit for RCS is detailed in HSE publication EH40/2005 Workplace Exposure Limits (see Essential information).

Inhaling RCS can lead to:

- Silicosis
  - Exposure to RCS over a long period can cause scarring of the lung tissue with a loss of lung function.
  - In the early stages of disease there are often no symptoms.
  - As the disease gets worse there is shortness of breath and eventually individuals may find it difficult to walk short distances.
  - Acute silicosis is a rare complication of short-term exposure to very large amounts of crystalline silica; this condition is life-threatening.
  - Workers with silicosis are also at an increased risk of tuberculosis, kidney disease and arthritis.
- Lung cancer
- COPD which is a long-term illness that develops gradually over several years. The lungs are permanently damaged making it difficult to breathe. The risk of COPD is increased by smoking.

RCS dust is also abrasive and drying when in contact with skin and can lead to contact dermatitis. Wet working can also lead to dermatitis.

Dried slurry can, if disturbed, produce airborne dust which may be hazardous by inhalation.

### How to manage the health risk from RCS

- ✓ Reducing exposure to an adequate level always involves a mixture of equipment and ways of working. This means employers should:
  - Use an alternative stone with a lower silica content where possible.
  - Choose the most effective and reliable control measures.
  - Ensure controls work effectively when first used, and continue to protect people by carrying out regular maintenance.



- Ensure controls are used properly by instructing, training and supervising workers.
- Regularly check and review all elements of your control measures to ensure they are protecting workers, taking corrective action when needed.

Follow all the points listed below and what is described in the ST series sheets, or make sure you use equally effective measures to adequately control exposure to dust containing RCS.

#### **Reduce the amount of RCS dust generated**

- ✓ Substitute stones with ones containing less crystalline silica when reasonably practicable.
- ✓ Use lower speed powered, or unpowered, tools.
- ✓ Use effective water suppression.

#### **Control RCS exposure**

- ✓ Automate and enclose the process where reasonably practicable, so workers are not close to the source of dust.
- ✓ Provide effective water suppression:
  - Ensure an adequate supply of clean water for dust suppression.
  - If the water is recirculated:
    - establish a programme of checks and maintenance to ensure that conditions do not allow the growth of bacteria, including legionella.
    - replace contaminated water regularly to prevent the build-up of silica in the water.
- ✓ Do not allow gulleys containing crystalline silica contaminated water to pass through clean work areas.
- ✓ Minimise exposure to the mist generated by use of water suppression as it contains crystalline silica:
  - enclose the process whenever reasonably practicable to reduce the spread of mist.
  - segregate the area and limit access – site control panels away from the source.
  - use equipment suitable for the type and thickness of stone being processed eg guards that enclose most of the cutting blade on a saw.
  - use baffles and absorbent material behind fixed saws to help control the mist produced.
  - provide a good standard of general ventilation to prevent mist build up.
- ✓ Use on-tool water suppression with hand-held powered tools where reasonably practicable and safe to do so.
- ✓ Where water suppression is not reasonably practicable, provide LEV eg an extracted booth:
  - Take account of the energy of the process and direction of dust when designing and installing LEV – seek competent advice if necessary.
  - Avoid the use of capturing hoods for cutting and polishing tasks – they are unlikely to be able to adequately control the energetic dust generated.

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- Mount workpieces on an open framed rotating banker so workers can easily rotate the workpiece to keep the dust directed into the booth.
  - Discharge extracted air to a safe place outside the building away from doors, windows and air vents.
  - Do not use a recirculating local exhaust ventilation (LEV) system unless the air is thoroughly cleaned before its return to the workplace.

**Make sure people are responsible for carrying out regular checks and maintenance**

- ✓ Ensure the LEV systems continue to work effectively through daily, weekly and monthly checks – follow manufacturer's instructions as appropriate:
  - Fit an indicator or alarm to show the system is working effectively.
  - Regularly maintain and check all parts of the system, including moving parts eg fan bearings and filter shakers – remember RCS is abrasive. Repair any faults or damaged parts found.
  - Have a thorough examination and test carried out by a competent person at least once every 14 months (this is a legal requirement).
  - Keep records of maintenance and checks for 5 years.
- ✓ Ensure water suppression systems continue to work effectively and that an adequate water supply is available. Where water is recirculated establish a programme of checks and maintenance to ensure that conditions do not allow the growth of bacteria, including legionella.
- ✓ Clean down the equipment before starting maintenance – use wet or dustless methods.
- ✓ Air monitoring may be needed to show that adequate control of exposure to RCS is being achieved by the systems in place. See sheet G409 in Essential information.

**Provide PPE, including respiratory protective equipment (RPE), when engineering controls alone are inadequate to control the risk.**

- ✓ Have an effective management programme for PPE to ensure that it is used correctly.
- ✓ Ensure reusable PPE (including RPE) is appropriately cleaned, stored and kept in working order.
- ✓ Select suitable and adequate RPE for the task, in consultation with the workforce, eg RPE with an assigned protection factor (APF) of at least 20 for workers exposed to mist containing silica from water suppression. For workers exposed to dry RCS dust, an APF of at least 40 will be required. See sheets R3, R4 and R5 in Essential information.
- ✓ Provide powered respirators or breathing apparatus which should be used if the RPE needs to be worn continuously for more than one hour (see sheets R4 and R5 in Essential information).
- ✓ Workers must be face fit tested and be clean shaven when using RPE that relies on a tight fitting seal to the face (see Fit2Fit and INDG479 in Essential information).
- ✓ For reusable RPE change the filters on respirators in accordance with manufacturer's recommendations and if:
  - the shelf-life expiry date has passed

- they are damaged or visibly contaminated
- they become harder to breathe through.
- ✓ For reusable RPE, a thorough maintenance, examination and test should be carried out at least once a month. However, if the RPE is used only occasionally, an examination and test should be carried out before use and, in any event, the interval should not exceed three months.
- ✓ Air supplied to breathing apparatus should meet minimum quality requirements, in line with the latest British Standard.
- ✓ Provide workers with coveralls that do not retain dust – synthetic rather than cotton.
- ✓ Use a contract laundry or a suitable equivalent to wash work clothing – warn them that the dust contains silica. Do not allow workers to launder work clothing at home.

#### **Implement effective cleaning regimes**

- ✓ Clean work equipment and the work area daily. Clean other equipment and the workroom regularly – at least once a week.
- ✓ Do not allow dust to accumulate on surfaces – implement a high standard of regular cleaning and housekeeping using wet or vacuum methods.
- ✓ Use vacuum equipment that meets at least the dust Class M (medium hazard) classification.
- ✓ If using wet methods, ensure that any slurry created does not dry out and create an additional source of RCS dust.
- ✓ Avoid the use of brushes or compressed air for removing dust from clothing, surfaces and machinery.

#### **Ensure your workers understand the risks from RCS**

This will include:

- the health hazards of RCS, how they can be exposed to it and the importance of control measures (such as water suppression, extraction, RPE and cleaning regimes).
- safe work procedures, including how to safely use, check and maintain process equipment and control measures. Provide supervision to ensure that safe working procedures are followed.
- maintaining good skin hygiene and minimising their risk of dermatitis.
- how to recognize and report any faults, concerns, or early signs of ill-health.
- keeping training records is helpful to demonstrate what information, instruction and training has been provided.

#### **Carry out health surveillance for all workers regularly exposed to RCS dust**

- ✓ To detect early signs of COPD, silicosis and dermatitis, you should carry out health surveillance (see sheets G403 and G404 in Essential information).
- ✓ Early signs of these diseases may indicate that you are not adequately controlling exposure.
- ✓ You will need to take advice from a competent occupational health professional (doctor or nurse) when setting up a health surveillance programme.

By implementing these measures in your workplace you will be reducing the risk of exposure to RCS and complying with the law, but you will need to keep checking and reviewing them so that they continue to be effective.

If you are in doubt about the controls necessary, or how to implement them, in order to achieve adequate control of exposure to RCS, you should seek competent advice eg from the BOHS Directory of Occupational Hygiene Services.

### How to use the sheets

- ✓ Follow all points described in the sheets or use equally effective measures.
- ✓ Consider the processes/tasks and hazardous substances in your workplace.
- ✓ Look for opportunities to substitute with less hazardous materials.
- ✓ Examine the advice sheets for each of the tasks.
- ✓ Examine the essential information sheets listed on each advice sheet.
- ✓ Compare operations in your workplace with recommendations in the advice sheets for all of the relevant tasks.
- ✓ Record your findings and any actions you need to take covering: issues identified, planned actions, target completion date, person responsible, status of any issues, and a review of effectiveness (this forms part of your risk assessment).
- ✓ Keep a record of your actions to control exposure of workers to hazardous materials.

### Essential information

You can find the full COSHH essentials series at <https://www.hse.gov.uk/coshh/essentials/direct-advice/stonemasons.htm>

R3 – UK Assigned Standard Protection Factor 20 (APF20)  
<https://www.hse.gov.uk/pubns/guidance/rpe3.pdf>

R4 – UK Assigned Standard Protection Factor 40 (APF40)  
<https://www.hse.gov.uk/pubns/guidance/rpe4.pdf>

R5 – Breathing Apparatus with UK Assigned Standard Protection Factor 40 (APF40) <https://www.hse.gov.uk/pubns/guidance/rpe5.pdf>

G403 – Health surveillance for occupational contact dermatitis (OCD).  
<https://www.hse.gov.uk/pubns/guidance/g403.pdf>

G404 – Health surveillance for silicosis.  
<https://www.hse.gov.uk/pubns/guidance/g404.pdf>

G409 – Exposure measurement: Air sampling.  
<https://www.hse.gov.uk/pubns/guidance/g409.pdf>

Guidance on respiratory protective equipment (RPE) fit testing Leaflet INDG479(rev1) HSE 2019 <https://www.hse.gov.uk/pubns/indg479.htm>

Fit2fit Accreditation - Fit2Fit RPE Fit Test Providers Accreditation Scheme  
<https://www.fit2fit.org/>

EH40/2005 Workplace exposure limits HSE 2020  
<https://www.hse.gov.uk/pubns/books/eh40.htm>

British Occupational Hygiene Society (BOHS)

Directory of Occupational Hygiene Services  
<https://www.bohs.org/information-guidance/>

### Further information

Controlling exposure to stone dust, HSG201  
<https://www.hse.gov.uk/pubns/priced/hsg201.pdf>

Control of exposure to silica dust – A guide for employees INDG463  
<https://www.hse.gov.uk/pubns/indg463.pdf>

Controlling airborne contaminants at work: A guide to local exhaust ventilation (LEV) HSG258 HSE 2017  
<https://www.hse.gov.uk/pubns/books/hsg258.htm>

New and existing engineering control systems  
COSHH essentials guidance sheet G406 HSE  
<https://www.hse.gov.uk/pubns/guidance/g406.pdf>

Respiratory protective equipment at work:  
A practical guide HSG53 (Fourth edition) HSE 2013  
<https://www.hse.gov.uk/pubns/books/hsg53.htm>

Health surveillance for those exposed to respirable crystalline silica (RCS) – Guidance for occupational health professionals, Published 2015, <https://www.hse.gov.uk/pubns/priced/healthsurveillance.pdf>

Control of substances hazardous to health: The Control of Substances Hazardous to Health Regulations 2002. Approved Code of Practice and guidance L5 (Sixth edition) HSE 2013  
<https://www.hse.gov.uk/pubns/books/l5.htm>

Institute of Local Exhaust Ventilation Engineers Accredited members

Information on health and safety for stone working in the stone manufacturing and construction industries can be obtained from:

- The Health and Safety Executive at <https://www.hse.gov.uk/stonemasonry/index.htm>
- Stone Federation at <http://www.stonefed.org.uk>
- Worktop Fabricators Federation <https://www.worktopfabricators.org/>
- Quarry Partnership Team (QPT) at <https://www.safequarry.com/qpt.aspx>
- Construction Dust Partnership (CDP) at <https://www.citb.co.uk/health-safety-and-other-topics/health-safety/construction-dust-partnership/>

For information about health and safety visit <https://books.hse.gov.uk> or <https://www.hse.gov.uk>

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