# Control of respirable crystalline silica in quarries


**This is a free-to-download, web-friendly version of HSG73 (Second edition, published 2008). This version has been adapted for online use from HSE's current printed version.**

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This book provides a practical means to reducing exposure to silica dust in various quarrying operations. Advice is also given on how to ensure that all control measures are kept and maintained in good, efficient working order.

This guidance is primarily aimed at employers responsible for managing and running quarries and other employers (contractors) who are involved with quarrying activities. It also applies to managers, supervisors, health and safety specialists, workers and their representatives.

The book is split into sections, focusing on: assessment; sampling; prevention and control; screening; and RPE. The book also provides guidance on other aspects of controlling exposure.

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This guidance is issued by the Health and Safety Executive. Following the guidance is not compulsory 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 as illustrating good practice.

# Contents

# Introduction

1 This guidance is aimed primarily at employers responsible for managing and running quarries, and other employers (contractors) who are involved with quarrying activities. It also applies to managers, supervisors, health and safety specialists, workers and their representatives.

2 Respirable crystalline silica (RCS) is assigned a workplace exposure limit (WEL) of 0.1 mg/m$^3$ in Schedule 1 of the Control of Substances Hazardous to Health Regulations 2002 (COSHH).[1] The WEL is expressed as an 8-hour time-weighted average (see HSE Guidance Note EH40, *Occupational exposure limits*).[2]

3 Practical means of reducing exposure to silica dust in various quarrying operations are described. Advice is also given on how to ensure that all control measures are kept and maintained in good, efficient working order.

4 Other guidance is available on controlling exposure to respirable crystalline silica, particularly that published in relation to the 2006 European Social Dialogue Agreement on Respirable Crystalline Silica, which includes a good practice guide and task sheets. Quarry operators are free to choose which guidance to follow, provided that the requirements of the COSHH Regulations are complied with.

# Exposure to respirable crystalline silica

5 Crystalline silica, in the form of the mineral quartz, is found in many different materials, with some sandstone being almost pure quartz. Exposure to respirable crystalline silica in the extractive industry is governed by many factors, especially:

- the proportion of silica in the material;
- the mechanical work involving breaking up and/or processing the material;
- work patterns influencing when and how individuals may become exposed.

6 It must be stressed that the WEL for crystalline silica applies only to the **respirable** fraction of the silica dust. This is the portion of the dust that reaches the deepest parts of the lungs, and is normally 10-20% of the total inhalable dust, though this proportion can vary considerably.

7 The amount of free silica in the respirable dust does not necessarily have any relationship to the proportion in the parent material. Correct assessment of exposure therefore depends on suitable methods of sampling and analysis of the respirable dust.

8 In parts of the industry where the silica content of the material is low, exposure levels to respirable crystalline silica may well be below the WEL. Even so, exposure to inhalable dust should not exceed 10 mg/m$^3$ over an 8-hour period and exposure to respirable dust should not exceed 4 mg/m$^3$. Where there is evidence of hazards to health below these levels, exposure should be controlled accordingly.

# Assessment of exposure

9 Where exposure to respirable crystalline silica may arise, an assessment must be made of the risks to workers' health, required by regulation 6 of the COSHH Regulations. The assessment will determine what control measures are likely to be needed and any other steps necessary to comply with the regulations. *COSHH essentials in quarries QY0: Advice for managers*[3] provides further information.

10 Quarry workers may well have varying patterns of exposure to respirable crystalline silica. In the risk assessment it may be possible to distinguish those who have continuous exposure at a consistent level from those whose exposure is largely due to short-term work in dusty conditions. For some workers the exposure might follow a complicated pattern. The risk assessment is the key to ensuring workers' exposure is reduced to the lowest levels achievable, and is the essential first step towards control.

11 In preparing the risk assessment, for each job or range of tasks being reviewed you should include the following:

- potential for exposure – examine all tasks, not forgetting non-routine work (emergency breakdowns etc);
- examination of existing controls;
- effectiveness of existing controls, where applicable using dust survey information, use of dust lamp etc;
- whether further engineering controls are necessary (ie what needs to be done to achieve and sustain adequate control);
- use of respiratory protective equipment, of an approved type, at any particular location or task;
- maintenance, examination and testing of engineering controls;
- monitoring;
- health surveillance;
- information, instruction and training of employees.

12 Tailor the risk assessment to the exact circumstances, working practices and patterns in the workplace, and present both the assessment and resulting systems of work in a way those who are affected can understand.

13 A risk assessment is not a static document and you will need to review it regularly, for example:

- when the original assessment is no longer valid;
- when significant changes in work occur, eg volume of production, plant, materials, process, control methods;
- if ill health related to work is reported;
- when new evidence about hazards of respirable crystalline silica become known;
- if monitoring or health surveillance results show loss of control;
- if new or improved techniques of control become available.

14 The risk assessment should also include contingency plans for handling dust emitted during breakdown conditions. Laboratory workers also need to be considered during the preparation of an assessment.

# Sampling

15 Since exposure levels to RCS in mixed dusts cannot be predicted on the basis of the silica content in the parent material, the assessment will depend upon a suitable sampling strategy. *General methods for sampling and gravimetric analysis of respirable and inhalable dust*[4] gives further information.

16 In general, the use of personal sampling (that is with the sampling instrument attached to the employee) rather than fixed-point sampling (sampling at a particular location) is the only method likely to give an accurate picture of the level of exposure suffered by the individual. A sampling survey in itself does not constitute a risk assessment.

# Prevention and control

17 Regulation 7 of the COSHH Regulations requires that the exposure of employees to RCS is prevented or, if this is not reasonably practicable, adequately controlled. The prevention of exposure to airborne crystalline silica should be the main objective. You can achieve a great deal through the careful design of equipment, particularly chutes and transfer points, and by changes in working practices. Further guidance is given in *Dust: general principles of protection*.[5] Respiratory protective equipment (RPE) can only be used to secure adequate control when all other reasonably practicable measures have been taken but have still not achieved adequate control.

18 Equipment/methods for dust control include:

- **suppression** – water, steam, mist or fog sprays;
- **collection** – cyclones, scrubbers, bag fitters, electrostatic precipitators;
- **containment** – encapsulation.

These can be used singly or in combination.

19 With suppression the aim is to prevent the escape of dust from the source. The method is usually by the placement of suitable sprays. The use of wetting agents/additives in the water overcomes the interface tension between water and the dust. Another advantage of additives is that water consumption is reduced. It is difficult to ensure that all of the respirable-sized particles are wetted and entrapped by the water droplets due to the high surface tension of the droplets. Simple water sprays may not be as effective as fog or mist sprays.

20 All extraction systems, as the name implies, involve the removal of dust-laden air from a source. There are a number of components common to all systems, ie hoods, enclosures, ductwork, a filter or other air-cleaning device, and a fan. These components should be compatible with each other and should be properly designed and be suitable for the purpose. The guidance book *Controlling airborne contaminants at work: A guide to local exhaust ventilation (LEV)*[6] gives further information.

21 Crushing, screening, coating and other processes are also subject to the requirements of the Environmental Protection Act 1990,[7] and you should seek the advice of the appropriate enforcing authority under that Act when planning dust control measures on such plant.

# Drilling

### Hand-operated drills

22 Used mainly for the drilling of small diameter holes in monumental stone quarrying, these can be used for explosives, plug and feathers or hydraulic splitters. Usually air flushing is used and dust discharged from the hole causes operator exposure and environmental nuisance.

23 Dust control can be achieved using water fed into the compressed air suppressing the dust, but water supplies need to be maintained and precautions are required during cold weather to protect against freezing. Additional protective clothing, in the form of waterproof aprons, is required. An alternative method involves a dry collection system.

### Drilling rigs

24 These usually have a hole size of more than 75 mm in diameter and are used mainly for the drilling of holes for blasting at various types of quarrying operations. Air flushing with considerable quantities of dust discharged from the hole position causes similar problems to those of hand drills.

25 Dust control can be achieved as with the hand drills. Water can be used in the air stream but additives need to be used (lubrication) and precautions taken for cold weather use. The use of a foaming agent for dust control techniques is also available. Dry collectors in the form of cyclones and bag filters are commonly employed. More modern and larger machines have integral control cabins for the operator, from which all of the machine functions can be controlled remotely. These cabins additionally provide protection from noise and the elements, and further improvements can be achieved with the fitting of air conditioning. *COSHH essentials in quarries QY1: Rock drilling*[8] provides further information.

# Crushing/milling

26 There are basically two methods of crushing, ie by compression and by impact. The main machine types are:

- **compressive** – jaw crushers, gyratory crushers, cone crushers, roll crushers, ball mills, rod mills;
- **impact** – rotary impactors, hammer mills (fixed or swing hammers).

27 All types of crushing reduce the rock in size. The compressive-type crushers produce dust but do not themselves induce excessive air movement, although moving materials do, and dust either from the materials or the actual crushing process becomes airborne. Impact-type crushing machines involve a rotating member, which acts as a fan and generates considerable air movement. With this type of high-reduction crushing, considerable quantities of airborne dust are generated.

28 Water suppression can control dust on compressive crushers, provided that the moisture content of the product does not cause problems further along the process. Cold weather protection will be needed. Extraction can be used with the placement of suitably designed capture hoods.

29 Water fed directly into impact crushers can have a marked effect on dust reduction as the action of the crusher disperses the water. This method is particularly useful if an all-in-one product is being produced.

30 Impact crushing machines can be installed over a hopper or stone box with a feeder underneath. Providing the hopper is not emptied, the lower stone section provides a plug to prevent excessive dust getting into the air. An extraction system attached to the top section of the encased hopper removes the dust created by the rotor. *COSHH essentials in quarries QY3: Crushing*[9] provides further information.

31 Every crusher type has some limitations when it comes to dust control. To reduce dust exposure levels on crushing plants that are constantly staffed, the operators should be inside a remotely positioned control cabin. To keep dust levels at a minimum the enclosure should be kept slightly above atmospheric pressure. This will prevent the contaminated air getting in and ensure that any airflow through leaks etc is outward. The air supply to the control cabin should be dust-free and passed through a particulate filter.

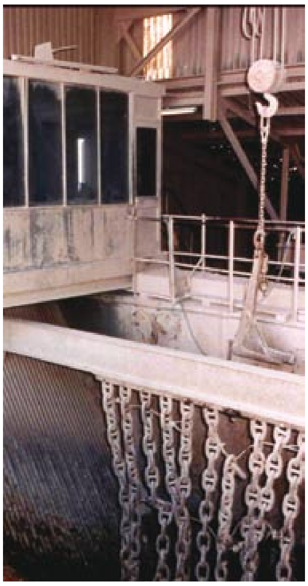

**Figure 1** Control cabin on crushing plant

32 It is recommended that a coarse pre-filter and a high-efficiency filter, eg a high-efficiency particulate arrestor (HEPA) filter, be installed in series. The air should preferably be drawn from the outside of the crusher building or other clean source, which will prolong the life of the filters. The siting of the control cabin or refuge near an external wall will therefore be an advantage.

33 Any fan provided to ventilate the control cabin should be capable of achieving its rated airflow against the resistance presented by the filters, ducting, leak points and external wind pressures. This may require a centrifugal fan. The ventilation rate for the whole control room should be around a minimum of five air changes an hour. As high air speed can cause uncomfortable draughts, the inward airspeed should be less than 0.2 m/s and the air should not be directed towards the occupant. For example, a refuge measuring 2 x 2 x 2 m, ie 8 $m^3$, requires a fan rated at 40 $m^3$/h or 0.011 $m^3$/s. This would give an airflow rate through 25 x 25 cm ducting of 0.18 m/s. *COSHH essentials in quarries QY11: Control cabins and vehicle cabs*[10] provides further information.

# Screening

34 There are numerous types of screening equipment, many of which are designed for specific uses. Screens are used to extract or reject specific-sized material from the feed product. These may be located singly or in various arrangements or groups in a screenhouse. Screening equipment creates dust by degradation and the action also affects the release of dust in the material.

35 Screening may be carried out using water to wash or rinse the material and in such cases airborne dust may not be a problem. Excessive moisture can, however, cause blinding of screen decks. Asphalt or coated stone plants frequently screen hot materials, which presents airborne dust problems.

36 Wet suppression can successfully be used to control dust on primary and scalping screens (subject to cold weather protection being provided). On other screens either complete or partial encapsulation with some form of extraction system can be effective, but on screens for hot materials, complete encapsulation with extraction is essential. If complete screen houses are considered as an enclosure, personnel should only be allowed to enter if RPE is used. Entry to such enclosures should be avoided where possible and the use of closed circuit

television to view the interior should be considered. *COSHH essentials in quarries QY5: Dry screening*[11] provides further information.

# Conveyors/feeders/loading

37 Conveyors, feeders and loaders are used to transfer the product from one position to another. Dust is liberated from the transfer points and this can be aggravated if they are not enclosed and protected from wind.

38 Wet suppression (depending upon the product) can be used to control dust. It should be automatically operated so that it is only used when material is being conveyed. Hoods with extraction-to-collection equipment can effectively control dust emission from this source. You can also use integrated collection units at transfer points, with the collected dust being deposited onto the conveyor; no ducting is required for this system. Another option is an enclosed conveyor system, which has advantages in preventing dust emission and spillage problems.

39 Airborne dust is a particular problem during the loading of vehicles with dry materials. At the quarry face, you can prevent operator exposure by fitting air conditioning to the cabs of vehicles, and keeping windows and doors closed. At stockpiles or other loading positions, alternative means of dust control such as water sprays can be considered. Loading from conveyors onto vehicles can also create dust problems, and again for most materials the use of water sprays has advantages. When loading tankers with powders and dry, fine materials, you can reduce dust emission by the use of local exhaust ventilation attached to the loading spout.

# Heating/drying

40 The heating of rock fragments inevitably gives rise to large emissions of airborne dust, unless the exhaust gases are fully treated. Pre-cleaning using cyclones followed by wet collection or bag filtration is usually necessary to give adequate control, and such systems must have enough capacity to handle high gas volumes. Combined dryer/coating units or ‘drum mixers’ present slightly fewer problems but still require adequate dust and fume arrest.

41 Whenever hot, dry materials are conveyed, screened or loaded onto vehicles etc, serious airborne dust problems can occur. Extraction systems and/or encapsulation (as described in paragraph 36) are usually employed to control the dust, but on bin overflow chutes the free falling materials, especially the ‘fines’, create considerable airborne dust. Directing the overflow into a confined area or hopper can overcome the dust problem.

42 On heating and drying plant, cabins may be needed for operatives to achieve adequate control. *COSHH essentials in quarries QY4: Drying and cooling*[12] provides further information.

# Bagging

43 Products bagged while damp do not present any dust problems. Dry materials, particularly powders, and bag damage do present dust problems.

44 Automatic bagging units keep workers away from dusty environments (as well as reducing the risk of musculoskeletal injury), although there need to be systems of work for dealing with broken bags and spillages. Older bagging units may not have integral dust control. Air venting from the filling bags and spillages are sources of dust exposure to the operators. The use of purpose-designed bags with filling vents, which create a semi-closed system, is a valid control method as part of an overall risk management scheme. The use of exhaust ventilation and hoods/enclosures can bring about improvements, but RPE may still be necessary if engineering controls do not achieve adequate control.

45 Further information is given in *COSHH essentials in quarries QY7: Jumbo bag filling 500-1500 kg*;[13] *QY8: Silica flour: small bag (15-50 kg) filling and transfer*[14] and *QY9: Mineral powders: small bag (15-50 kg) filling and transfer*.[15]

# Sawing

## Portable hand-operated saws

46 These are generally used in monumental stone and slate quarries for the cutting of stone and for the creation of a slit to enable wedges to be used for splitting.

**Figure 2** Sawing – dry

**Figure 3** Sawing – wet

47 A water supply onto the cutting position can considerably reduce any dust escaping to the atmosphere.

## Static saws

48 A wide range of saw types is used for cutting blocks of stone and slate into selected sizes. Most saw blades are diamond tipped and use water for cooling. The water also acts as a dust suppressant. Enclosures around the saw, as well as ventilation as close to the workpiece as possible, are essential for effective dust/aerosol control. With well-designed control equipment, workplace exposure levels can be well below the WEL and RPE is unnecessary.

### Splitting/dressing

49 This activity takes place at monumental stone and slate quarrying operations. Some splitting involves drilling small diameter holes and using plug and feathers or hydraulic splitters. The control of drilling dust is as described in paragraph 23. The use of chisels for the splitting and dressing of slate creates dust in the breathing zone of the operator; the hand dressing of stone (masonry work) also creates dust emissions.

**Figure 4** Dust cloud as seen under normal lighting

**Figure 5** Dust cloud as seen by forward scattering of light using a dust lamp

50 Well-designed extraction systems following the principles of good local exhaust ventilation (LEV) will reduce RCS exposure during stone splitting and dressing, but regular checks need to be made to ensure that control remains adequate. A dust lamp is particularly useful for demonstrating the effectiveness of any extraction system. RPE may be necessary in the short term until improved engineering control has been achieved, particularly where the operator's face is close to the workpiece. Improved housekeeping can also benefit dust emission/exposure.

51 Other activities including stacking are a source of dust and you need to properly and competently assess personal dust exposure during these activities. You may need to adjust working patterns to achieve control below the WEL.

## Miscellaneous situations

### Roads

52 During dry weather, dust levels generated from roads and similar areas can be high, particularly if they are not surfaced. Dust is liberated by the wind and by vehicles. The use of windscreens, suitably positioned alongside roads or stockpiles, can create sheltering. Every effort should be made to prevent product spillage onto the road surface.

53 Roads surfaced with tarmac or concrete will generate less dust, and these should be kept clean with a sweeper and/or damped down with water from a bowser or from permanent sprays. On unsurfaced and other roads the use of water can prevent excessive dust problems. Chemicals (calcium chloride in particular) also have an application for the treatment of road surfaces to reduce dust generation, but these have limitations in that a fresh application needs to be made after rainfall and you need to be careful to avoid contaminating water courses.

54 Vehicle speed is a factor and exhausts directed towards the ground increase the problem. Vehicle radiator fans can also distribute dust on roadways. Speed

control, and exhaust discharges and fan enclosures directed away from the road surface, can reduce dust levels.

55 Further information is given in *COSHH essentials in quarries QY2: Excavating and haulage*.[16]

### Spillage and dust accumulations

56 Many airborne dust problems result from spillage that is not cleaned up.

57 You should prevent spillage from conveyors, transfer points etc by improving plant design and maintenance, ie repair holes in chutes and replace worn-out conveyor skirt rubbers. Housekeeping should include routine cleaning up. Use vacuum cleaning equipment fitted with high-efficiency filters for cleaning up fines and dust, rather than shovelling and brushing, to reduce settled dust becoming airborne again. *COSHH essentials in quarries QY10: Cleaning up silica dusts*[17] provides further information.

### Transfer of material

58 Do not overlook the need for properly enclosed systems to empty and transfer dry dust from collection units. Disposal methods and locations need to prevent the collected dust, or the dried-out sludge from wet arresters, becoming airborne.

# Respiratory protective equipment (RPE)

59 Sometimes the use of RPE is likely to be the final option to achieve acceptable long-term time-weighted average (TWA) exposures to respirable crystalline silica. Generally, respiratory protection is most important when operators are exposed to high concentrations of dust for short periods of time. Longer-term exposures to high dust concentrations should be dealt with by other control measures.

**Figure 6** Brushing up

**Figure 7** Use of vacuum cleaning equipment

60 The use of RPE is not a substitute for other reasonably practicable control measures, but it is an extremely important part of the overall strategy to minimise

personal exposures to respirable crystalline silica. Failing to recognise the need for a respirator programme or poor management of the implementation of the programme will result in completely unnecessary operator exposures, and greater incidence of unnecessary occupational ill health.

61 Assessments of workplace dust concentrations will give an indication of the standard of respiratory protection required. It will always be necessary to provide equipment that is effective against respirable-sized particles. HSE's guidance booklet *Respiratory protective equipment at work*[18] gives information on all aspects of managing RPE.

62 Disposable filtering facepiece respirators and half-mask respirators give the lowest level of protection. Full-face respirators and powered respirators with helmets or hoods may provide a higher standard of protection.

63 The greatest dust levels will generally require the higher standard of RPE protection, and you should choose equipment which will be operating well within its designed capability. Powered respirators require careful maintenance and recharging facilities if they are to remain effective.

64 The key to successful use of RPE is in identifying those areas where it is needed. Quarry workers may need to wear RPE for as little as five minutes an hour if it is during that period that the highest exposures occur. Well-defined mandatory respirator zones should be established. Careful use of RPE can result in dramatic reductions in personal exposures, and in areas where dust emissions are otherwise uncontrollable it will be a reasonably practicable option.

65 There are five elements for a successful respirator programme. Failure in any one results in loss of protection and exposes the operators to greatly increased risk of developing irreversible and progressive lung conditions in later life. The five elements are:

- **selection** – performance of the equipment and consideration of the conditions of use;
- **training** – how to use the equipment, why it is necessary and when it should be used to gain greatest benefit;
- **use** – understanding when the equipment is required and clear instructions on parts of the plant that are mandatory respirator zones;
- **fit** – ensuring that the operator achieves the essential face seal with the equipment, which is vital if the suggested level of performance is to be reached;
- **maintenance** – care and a programme of inspection ensure that the initial performance characteristics of the RPE continue throughout its life.

# Maintenance, examination and testing of control measures

66 Regulation 9 of the COSHH Regulations requires that COSHH control measures should be maintained in an effective state, in efficient working order and in good repair. In addition, where engineering controls are implemented, employers shall ensure that thorough examinations and tests of those engineering controls are carried out, and in the case of local exhaust ventilation (LEV), tested at least once every 14 months.

67 At quarries the control measures may include:

- dust collectors on drills;
- water addition to the air line;
- water suppression sprays;
- screen hoods;
- encapsulation;
- extraction systems;
- dust collection equipment;
- integral units;
- water supply to saws;
- road damping.

68 Examples of the examinations and tests required are given in the table below. Precise details, such as frequency, pressures etc, should be obtained from the designers, suppliers or manufacturers.

69 The risk assessment may have determined that taking a particular measure would provide adequate control of exposure to silica dust. The assessment should also contain the specifications for that control, for example:

- dimensions of ducting, transport velocity, volume flow;
- static pressures at various points in the system;
- fan specification, volume, flow, direction of rotation;
- filter efficiency as indicated by a change in pressure drop; and
- velocity at catchment points.

70 This information is important not just to prove that an adequate assessment has been done, but also to provide the data against which future performance and maintenance checks can be compared.

71 It should be possible for the checks to be carried out by operators and ideally they should form part of a planned preventative maintenance scheme. This would have the advantage of reducing down time while ensuring that effective control is maintained. Such checks should be carried out at a minimum of weekly intervals.

72 Using a dust lamp can be useful for these checks. The Tyndall beam effect from the lamp only provides qualitative information but can enable any leaks, for example on seals and encapsulation systems, to be easily identified (see Figures 8 and 9).

**Figure 8** Screen seal as seen with normal lighting

**Figure 9** Screen seal as seen by forward scattering of light using a dust lamp

## Examples of control measures

| | Wet systems | Dry systems |
|---|---|---|
| **Drilling** | Water supply adequate<br><br>Pipes and connections in good order order and not kinked<br><br>Cold weather protection (where applicable) adequate<br><br>Water control valves in good order<br><br>Water flow as specified | Gasket/skirt on pick-up hood in good order<br><br>Suction hose not damaged, kinked or blocked with dust<br><br>Hose clips in correct position<br><br>Rubber dump valve/collection sack in order<br><br>Air supply to filter adequate<br><br>Anti-freeze protection (where applicable) in order<br><br>No blockages or build-up of dust inside collector<br><br>Filters in good order, ie not blocked or broken<br><br>No holes in collector or wear plate<br><br>On hydraulically powered units, pressures, fan condition and speed satisfactory, suction pressure and airflow tested |
| **Other processes: crushing, milling, screening, conveying, heating, drying, sawing, bagging etc** | Water supply adequate<br><br>Pipes and connections in good order with flow not restricted<br><br>Frost protection (where applicable) adequate<br><br>Water control equipment and valves in good order<br><br>Water flows as specified<br><br>Filters and sprays regularly checked and cleaned<br><br>Sufficient additives (where used) available and in use<br><br>Sprays correctly positioned<br><br>Electronic control system functioning correctly | Fans working with correct airflows<br><br>Seals, ducting, covers, enclosures correctly positioned and not damaged or blocked<br><br>Checks for signs of wear, tear or damage to ducts, hoods etc<br><br>Static pressures within limits at various positions should read as specified<br><br>Look out for worn or torn bags in bag filter units |

# Local exhaust ventilation (LEV)

73 In addition to the regular routine checks, all LEV should be thoroughly examined and tested at intervals not exceeding 14 months. Guidance booklet *Controlling airborne contaminants at work: A guide to local exhaust ventilation (LEV)*[6] gives further information.

74 The person carrying out the work should have sufficient knowledge, skill and experience to perform the examination and test effectively. This would normally be a competent engineer, but not necessarily a non-employee. He or she should be aware of the occupational hygiene hazards associated with the process, and of the risk the LEV is intended to control. Records should be kept of all examinations and tests.

# Health surveillance

75 Where workers are exposed to levels of respirable crystalline silica above 0.1 mg/m$^3$ 8-hour TWA, health surveillance schemes should meet the requirements of regulation 11 of the COSHH Regulations. Further guidance is given in *COSHH essentials G404: Health surveillance for those exposed to respirable crystalline silica (RCS)*.[19]

# Information, instruction and training

76 Regulation 12 of the COSHH Regulations requires that where workers are, or may be, exposed to respirable crystalline silica they have to be informed about the risks and the precautions to be taken. They also have to be informed of any monitoring that is carried out, and the collective anonymous results of health surveillance.

78 Instruction and training should include information on the correct use of control measures and, if necessary, details of the maintenance requirements. Employers have the duty to select suitable RPE for particular circumstances and to ensure that it is correctly used. Training and instruction is required to ensure that workers understand how to fit and wear RPE provided, where to store it and what to do if damage occurs or a replacement is needed. You should issue employees with HSE's free leaflet *Stone dust and you*.[20]

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10 *COSHH essentials in quarries QY11: Control cabins and vehicle cabs* www.hse.gov.uk/pubns/guidance/qyseries.htm

11 *COSHH essentials in quarries QY5: Dry screening* www.hse.gov.uk/pubns/guidance/qyseries.htm

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13 *COSHH essentials in quarries QY7: Jumbo bag filling* www.hse.gov.uk/pubns/guidance/qyseries.htm

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15 *COSHH essentials in quarries QY9: Mineral powders: small bag (15-50 kg) filling and transfer* www.hse.gov.uk/pubns/guidance/qyseries.htm

16 *COSHH essentials in quarries QY2: Excavating and haulage* www.hse.gov.uk/pubns/guidance/qyseries.htm

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# Further information

For information about health and safety ring HSE's Infoline Tel: 0845 345 0055 Fax: 0845 408 9566 Textphone: 0845 408 9577 e-mail: hse.infoline@natbrit.com or write to HSE Information Services, Caerphilly Business Park, Caerphilly CF83 3GG.

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