

Health surveillance for those exposed to respirable crystalline silica (RCS)

Guidance for occupational health professionals

Introduction

This guidance describes an example of a health surveillance programme for silicosis and is intended for occupational health providers and employers. In this guidance, it is stated who the competent person should be for carrying out each stage of the health surveillance.

An introduction to silicosis and health surveillance can be found in HSE's COSHH essentials sheet G404 (www.hse.gov.uk/pubns/guidance/g404.pdf).

Who should be included in the health surveillance programme?

Health surveillance for silicosis should be considered for workers who are involved in high-risk occupations, including construction, foundry work, brick and tile work, ceramics, slate, manufacturing, quarries and stonework. Where workers are regularly exposed to RCS dust and there is a reasonable likelihood that silicosis may develop, health surveillance must be provided.

Further examples of where health surveillance for silicosis may be appropriate include:

- where there have been previous cases of work-related ill-health in the workplace;
- where there is reliance on RPE as an exposure control measure for silica; or
- where there is evidence of work-related ill health in the industry.

Chronic obstructive pulmonary disease

The questionnaire and lung function testing elements of the health surveillance should help in identifying chronic obstructive pulmonary disease (COPD) which is also associated with exposure to RCS.

Tuberculosis

There is no current evidence to support the regular use of tuberculosis testing for silica-exposed workers. Any worker suspected of having tuberculosis should be referred by their GP to the local NHS TB service.

Use of chest X-rays

It is the responsibility of the employer to involve a health professional and discuss the need for posterior anterior (PA) chest X-rays as part of a health surveillance programme for silicosis.

As chest X-rays carry risks associated with the use of ionising radiation, their use always needs to be justified on health grounds even though the actual dose of

radiation required to carry out a single chest X-ray is very low. Periodic chest X-rays at the intervals described in the following section below are justified. Any X-rays need to be accessible for 40 years. These are likely now to be in a digital form.

Computerised tomography (CT) scanning can also be used, but this is currently normally reserved for those with an abnormal chest X-ray. There may be increased use of CT in the future for screening when the technology has improved.

Some employers have found that it is feasible to contract a provider to carry out X-rays using mobile services brought on to site, although a certain amount of space is required to set up on site. X-rays should be of sufficiently good quality to interpret and should be read by a suitably experienced radiologist.

Health surveillance in practice

Baseline assessment before or shortly after first exposure to RCS will include:

- respiratory questionnaire (Example 1); and
- lung function testing (spirometry) to measure forced expiratory volume (FEV₁) and forced vital capacity (FVC). FEV₁ is measured to within current American Thoracic Society (ATS)/European Respiratory Society (ERS) stipulated accuracy of 150 mls (or 100 mls if below 1 litre). The results should be recorded to monitor how values change with time (see Example 1B).

After one year of exposure to RCS

After one year of exposure to RCS, health surveillance will include:

- respiratory questionnaire;
- lung function testing; and
- PA chest X-ray.

After that, annual health surveillance will include:

- respiratory questionnaire; and
- lung function testing.

After 15 years of exposure to RCS

For employees who have had 15 years of exposure to RCS while working for one or more employer(s), the health surveillance for that year will include:

- respiratory questionnaire;
- lung function testing; and
- PA chest X-ray.

Thereafter

Subsequent health surveillance as detailed in Example 2 will be repeated annually (or earlier if indicated by the results of health surveillance or if a worker complains of symptoms in the intervening period). The employer may appoint a responsible person (supported by an appropriate health professional) so that workers can report symptoms.

Annual health surveillance will include:

- respiratory questionnaire;

- lung function testing; and
- every 3 years, a PA chest X-ray.

In summary

To summarise the above requirements:

- questionnaires and lung function tests will be performed annually; and
- PA chest X-rays will be performed after one year, after 15 years, and every 3 years after that, unless advised otherwise by a health professional.

Interpreting the results of health surveillance

The results of health surveillance should be explained to the individual by the health professional. If silicosis is diagnosed, the likely progression of the disease will be an important part of the discussion. The additional risk of smoking should be discussed with an individual who is a smoker. The outcome in terms of fitness for work will be given to the employer.

Health surveillance referral criteria

Respiratory symptoms

Any worker with the following should be referred to a health professional with appropriate expertise:

- the presence of any symptoms identified by the baseline questionnaire; or
- the development of any new respiratory symptom since the previous questionnaire.

When symptoms have been reported, the opinion of an appropriate occupational health professional is necessary regarding fitness for work. Health surveillance will then continue annually or if recommended by the health professional, more frequently.

Abnormal lung function results

Any worker with the following should be referred to a health professional with appropriate expertise:

- the presence of abnormal lung function at any time point, defined as follows:
 - a reduction in the FEV_1/FVC ratio to less than 0.7 (70%); or
 - a reduction in the percentage predicted FEV_1 and/or percentage predicted FVC to less than 80% of the predicted value;
- accelerated annual decline in FEV_1 , measured over time as follows:
 - FEV_1 fall over one year of 500mls or more; or
 - FEV_1 fall over 5 years of 500mls (an average of 100mls per year each year).

All previous lung function measurements should be included in the referral.

In this situation, the opinion of an appropriate occupational health professional is necessary regarding fitness for work. The usual pattern of health surveillance will then continue annually, or if recommended by the health professional, more frequently.

The following interim action points are suggested – any worker with:

- FEV₁ fall over one year of 200mls; or
- FEV₁ fall over two consecutive years of 200mls;

needs early repeat lung function testing.

Abnormal PA chest X-ray results

Any PA chest X-ray on a worker reported as showing small opacities International Labour Organisation (ILO) grade 0/1:

- if detected after one year of exposure to RCS, the chest X-ray should be repeated after 12 months, ie at the end of year 2. If there is no progression, chest X-rays should be performed after 15 years exposure and every 3 years after that; or
- if detected after 15 years exposure to RCS, chest X-rays should be performed every 3 years after that.

Any PA chest X-ray reported as showing small opacities ILO grade 1/0 or greater should be referred to an appropriate health professional – a respiratory specialist with an interest, ie expertise in occupational lung disease (OLD) – for further clinical assessment.

Fitness for work

The opinion of an appropriate health professional (an occupational health professional and/or a respiratory specialist with an interest, ie expertise in OLD) will be required to advise on fitness for work and any action necessary to slow progression of the disease.

The health professional should consider a number of factors, including scope for reducing exposure for the individual. Taking account of the outcome of the clinical assessment, occupational history and a review of findings from any previous health surveillance, one of the following may be recommended:

- continuing exposure with additional health surveillance; or
- a reduction in exposure with additional health surveillance; or
- removal from exposure.

Management of the affected worker

There should be a clear procedure for the management and follow-up of individuals referred for further clinical assessment (the person whose responsibility it is should also be identified).

Employees have to be given information to introduce the health surveillance programme, including what they will be told about their results and the type of actions that could follow. If clinically significant ('major') abnormalities, other than silicosis, are found on the chest X-ray, the individual should be told why they are being referred for further assessment via their GP.

Where, as a result of health surveillance, an employee is found to have an identifiable disease or adverse health effect, various duties fall to the employer. These are described in the Control of Substances Hazardous to Health (COSHH)

Regulations 2002 (as amended) regulation (11)(9) and regulation (11)(3), Health records: www.hse.gov.uk/pubns/priced/l5.pdf.

Management actions should include review of the risk assessment, provision of improved control where necessary and additional training for the individual.

Review of results

Conclusions drawn from looking at trends in health surveillance results across groups or tasks are important for the review of the risk assessment by the employer in order to ensure the controls are effective.

Example 1

RESPIRABLE CRYSTALLINE SILICA HEALTH SURVEILLANCE BASELINE RECORD

This is an example of a proforma that can be used.

It is a confidential medical record therefore appropriate consent will have to be obtained before any information within it (other than fitness for work) can be disclosed to the employer.

This proforma can be used for first attendance and then the annual questionnaire can be used subsequently.

Personal information:.....

Date of surveillance:..... / / 20

Surname:..... National Insurance no:.....

First name(s):.....

Work identification:.....

Date of birth:..... Gender: **M / F**

Height (without shoes)(m)

Home address:.....

.....

..... Postcode:.....

Contact phone number:.....

Date started this employment: / /

Previous employers with silica exposure:

YES* / NO *If YES, please provide details in Example 1A

Previous occupational health provider surveillance programmes:

YES* / NO *If YES, please provide details in Example 1B

Please provide details of hobbies or pastimes with potential for exposure to silica, eg DIY involving cutting or grinding stone

Example 1

Full Name in CAPITALS:.....

Occupational history in this employment:.....

Job title:.....

Do you work in a high-exposure job? For example, do you regularly undertake high-risk silica tasks like cutting, scabbling or grinding concrete, chasing, demolition or stonework?

Please provide details of tasks involving silica

Current use of respiratory protection (RPE) YES / NO

Details:.....

Type:.....

Face fit tested? **YES / NO**

If male; are you clean shaven? **YES / NO**

Total years exposed to silica dust at work years

Have you ever had to change or modify your job because it affected your breathing? **YES / NO**

Example 1

Previous diagnosis (by a medical doctor) of:

- | | | |
|--|-----------------|------------|
| <input type="checkbox"/> Asthma | YES / NO | Date:..... |
| <input type="checkbox"/> COPD | YES / NO | Date:..... |
| <input type="checkbox"/> Silicosis | YES / NO | Date:..... |
| <input type="checkbox"/> Pleurisy | YES / NO | Date:..... |
| <input type="checkbox"/> Tuberculosis | YES / NO | Date:..... |
| <input type="checkbox"/> Emphysema | YES / NO | Date:..... |
| <input type="checkbox"/> Chronic bronchitis | YES / NO | Date:..... |
| <input type="checkbox"/> Other respiratory problem | YES / NO | Date:..... |

If yes to any of the above, please give details:

Other previous diagnoses:

- | | | |
|---|-----------------|------------|
| <input type="checkbox"/> Kidney diseases | YES / NO | Date:..... |
| <input type="checkbox"/> Arthritis/connective tissue problems | YES / NO | Date:..... |
| <input type="checkbox"/> Vasculitis | YES / NO | Date:..... |
| <input type="checkbox"/> Other | YES / NO | Date:..... |

If yes to any of the above, please give details:

Do you take any medication? **YES / NO**

If yes, please provide details below:

Example 1

Respiratory questionnaire

Have you ever had:

- An injury or operation affecting your chest? **YES / NO** Date:.....
- Tuberculosis? **YES / NO** Date:.....

Do you usually cough during the day (or at night when on night work)? **YES / NO**

Do you usually bring up any phlegm from your chest on most days (or nights) for as much as 3 months each year? **YES / NO**

Do you cough up any blood? **YES / NO**

Does your chest ever become tight or breathing become difficult? **YES / NO**

Does your chest ever sound wheezy or whistle? **YES / NO**

Do you usually get short of breath when performing your normal daily activities?
YES / NO

During the past 3 years, have you had any chest illness that has kept you from your usual activities for as much as a week? **YES / NO**

Do you smoke? **YES / NO**

If yes, how much/many per day? a day

Have you had recent unexplained weight loss? **YES / NO**

Have you any other concerns about your health? **YES / NO**

If yes, please describe below:

Example 1

Lung function tests

Date completed / / By whom:.....

Best FEV ₁ (litres)*	Best FVC (litres)*	FEV ₁ /FVC	Best PEF** (litres/ min)	Percentage predicted FEV ₁	Percentage predicted FVC	Percentage predicted PEF

**American Thoracic Society quality criteria for spirometry; three satisfactory manoeuvres should be performed, with the best two FEV₁ and FVC being within 150 mls. Testing should continue until two such manoeuvres are obtained. The largest FEV₁ and the FVC should then be recorded in the table above, even if they come from separate blows (see Example 1C for full criteria).*

*** PEF: Peak expiratory flow*

Spirometer log up-to-date with verification/calibration **YES / NO**

Lung function comments:

Previous lung function tests should be summarised in Example 1B

Examination of chest

PA chest X-ray

Date taken: / / 20

Result:

Example 1

Silicosis **YES / NO**

Any other major (clinically significant) abnormalities identified **YES / NO**

Previous PA chest X-ray tests should be recorded serially in Example 1B

Outcome of health surveillance:

Please circle one:

Fit

Unfit

Fit with restrictions

Further tests advised:

Comments:

If referral made:

To whom:.....

By whom:.....

Date: / / 20

Date of next health surveillance:.....

The health record for this worker should now be completed

Example 1A

EXAMPLE 1A: PREVIOUS WORK AND SILICA MEASURES AT OTHER WORKPLACES

Please also include non-workplace silica exposure (eg from hobbies etc)

Dates (earliest first)	Name of workplace	How long exposed to silica?	Health surveillance Yes/No See also Example 1B	Silica levels if known	Exposed to other vapours, dusts, gases and fumes and If so, for how long?	Comments including use of respiratory protection, other controls eg LEV and use of power tools

Example 1B

EXAMPLE 1B: LUNG FUNCTION AND PA CHEST X-RAY RESULTS

PA Chest X-ray results to be added here

Lung function testing to be added here

Date	FEV ₁ (litres)*	FVC (litres)*	FEV ₁ /FVC	PEF (litres / min)	% predicted FEV ₁	% predicted FVC	% predicted PEF	Date	Result: silicosis: yes/no If yes, ILO grade	Notes, including any action taken re lung function and/or chest X-ray

Example 1C

EXAMPLE 1C: FULL CRITERIA FOR LUNG FUNCTION TESTS

Within manoeuvre criteria:

- Individual spirometers are 'acceptable' if they are free from artefacts as defined below:
 - cough during the first second of exhalation;
 - glottis closure that influences the measurement;
 - early termination or cut-off;
 - effort that is not maximal throughout;
 - leak;
 - obstructed mouthpiece.
- They have good starts; extrapolated volume, 5% of FVC or 0.15 litres, whichever is greater.
- They show satisfactory exhalation, duration of 6 s or a plateau in the volume–time curve or if the subject cannot or should not continue to exhale.

Between manoeuvre criteria:

- After three acceptable spirometers have been obtained, apply the following tests:
 - the two largest values of FVC must be within 0.150 litres of each other;
 - the two largest values of FEV₁ must be within 0.150 litres of each other.

If both of these criteria are met, the test session may be concluded.

If both of these criteria are not met, continue testing until both of the criteria are met with analysis of additional acceptable spirometers or a total of eight tests have been performed (optional) or the patient/subject cannot or should not continue.

Save, as a minimum, the three satisfactory manoeuvres.

Example 2

**ANNUAL RESPIRABLE CRYSTALLINE SILICA HEALTH SURVEILLANCE
QUESTIONNAIRE**

This is an example of a proforma that can be used.

It is a confidential medical record therefore appropriate consent will have to be obtained before any information within it (other than fitness for work) can be disclosed to the employer.

Name:..... Date: / / 20

Age:..... Date of birth: / / 20

Sex: **M / F**

Height in m if you know it, if not, feet and inches:.....

Has your job changed since your last health surveillance? **YES / NO**

Current occupation:.....

Time spent in this job: Years months

Total time worked in industry exposed to silica Years months

Do you take any medication? **YES / NO**

If yes, please provide details below:

Have you since your last examination had:

■ An injury or operation affecting your chest? **YES / NO**

■ Tuberculosis? **YES / NO**

Do you usually cough during the day (or at night when on night work?) **YES / NO**

Do you usually bring up any phlegm from your chest on most days (or nights) for as much as 3 months each year? **YES / NO**

Do you cough up any blood? **YES / NO**

Does your chest ever become tight or breathing become difficult? **YES / NO**

Example 2

Does your chest ever sound wheezy or whistle? **YES / NO**

Do you usually get short of breath performing your normal daily activities?
YES / NO

Since your last examination, have you had any chest illness, which has kept you
from your usual activities for as much as a week? **YES / NO**

Have you had any recent unexplained weight loss? **YES / NO**

Do you smoke? **YES / NO**

If yes, how many per day? a day

Have you any other concerns about your health? **YES / NO**

If yes, please describe below:

Example 2

Lung function tests

Date completed / / By whom:.....

Best FEV ₁ (litres)*	Best FVC (litres)*	FEV ₁ /FVC	Best PEF (litres/ min)	Percentage predicted FEV ₁	Percentage predicted FVC	Percentage predicted PEF

**American Thoracic Society quality criteria for spirometry; three satisfactory manoeuvres should be performed, with the best two FEV₁ and FVC being within 150 mls. Testing should continue until two such manoeuvres are obtained. The largest FEV₁ and the FVC should then be recorded in the table above, even if they come from separate blows (see Example 1C for full criteria).*

Spirometer log up-to-date with verification/calibration **YES / NO**

Lung function comments:

Previous lung function tests should be summarised in Example 1B

Examination of chest

PA chest X-ray

Date taken: / / 20

Result:

Example 2

Silicosis **YES / NO**

Any other major (clinically significant) abnormalities identified **YES / NO**

Previous PA chest X-ray tests should be recorded serially in Example 1B

Outcome of health surveillance:

Please circle one:

Fit

Unfit

Fit with restrictions

Further tests advised:

Comments:

If referral made:

To whom:.....

By whom:.....

Date: / / 20

Date of next health surveillance:.....

The health record for this worker should now be completed

Further information

For information about health and safety, or to report inconsistencies or inaccuracies in this guidance, visit www.hse.gov.uk/. You can view HSE guidance online and order priced publications from the website. HSE priced publications are also available from bookshops.

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.

This leaflet is available at: www.hse.gov.uk/pubns/books/healthsurveillance.htm

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