

# G409

COSHH Essentials:  
General guidance

## Exposure measurement: Air sampling

### Control approach 4: Special

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. See Essential information near the end of the sheet.

#### Introduction

This sheet explains what exposure measurement (air sampling) entails and what level of service you should expect from a consultant.

During the air sampling survey, ensure that all employees:

- co-operate with sampling surveys - these are for their benefit;
- do their jobs as normally as possible while being sampled;
- do not interfere with samplers – any adjustments will be obvious and will invalidate the sample;
- report any accidental damage or contamination of the sampler; and
- see the results of sampling, and are told what they mean.

#### Main Points

‘Exposure measurement’ often requires carrying out a measurement survey to assess people’s exposure to hazardous substances in workplace air, and discover how and why this exposure occurs.

Exposure assessment may be done in a number of ways:

- ‘Personal sampling’ is taking an air sample near the worker’s breathing zone to measure the amounts of airborne substances inhaled for a stated task.
- Background (Static) area sampling may be needed to assess controls. The results obtained are not exposure measurements and so should not be compared against workplace exposure limits (WELs).
- Sometimes you may also need to carry out biological monitoring of a worker’s breath, blood or urine. This will detect exposure via inhalation, through skin contact, and by ingestion. It may also indicate if respirators are not working properly.
- HSE publication HSG173 provides further guidance on air sampling, and HSE publication EH40/2005 provides more information on WELs. See Essential information.

#### When is exposure measurement required?

Exposure measurement is not an alternative to controlling exposure. Measurements are best done after controls have been applied.

Exposure measurement is required:

- for a COSHH assessment, to help in selecting the right controls;
- where there exists a serious risk to health resulting from inhalation of the substance;
- to check that relevant exposure limits are not exceeded;
- to check that your exposure controls are adequate, or if you need to make improvements;
- to help select the right level of respiratory protection;

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- after process or production changes meaning that exposure may have changed;
  - to show any need for conducting health surveillance;
  - when an Inspector issues you with an 'Improvement Notice' requiring exposure monitoring; or
  - where specifically required by law.

You should have specific objectives when commissioning an air sampling survey and review the results to determine whether any remedial action is necessary.

### How do I measure airborne substances?

- ✓ Normally you need specialised equipment which is attached to the worker or placed in specific locations to determine personal or background levels of exposure. Advice should be obtained from a competent Occupational Hygiene professional. See Further information.
- ✓ Other measurement methods include the use of electronic real-time monitors or colorimetric detector tubes to see if there is a problem with your controls.
- ✓ Ask tendering consultants for evidence of their competence, and that of any laboratories they plan to use. How will they check that you understand their report?

### Demonstration of control

- ✓ Exposures vary daily and may be higher on another day to when they were measured.
- ✓ Ensure you obtain sufficient data to enable you to make good decisions with certainty.
- ✓ When considering workers doing a specific job, a similarly exposed group (SEG), together with multiple exposure measurements will be needed to account for variability. You could pool data from several similar surveys.
- ✓ British Standard BS EN 689:2018 gives guidance on testing compliance with exposure limits. In simple terms, if three measurements for a given SEG are all below 10% of the relevant exposure limit then it is considered that there is compliance with the limit. This benchmark will increase for a greater number of measurements. If it is not met, then statistical analysis of six or more measurements can be used to demonstrate compliance. A consultant can assist you with interpreting the results and identifying any required action. See Essential information.
- ✓ Exposure should be controlled by measures that are proportionate to the identified health risks. For asthmagens, carcinogens and mutagens, exposure should be reduced to as low a level as is reasonably practicable (ALARP). In simple terms this means the effective application of recognised good control practice, such as that identified by HSE in COSHH Essentials.

### Important points you need your consultant to cover

- ✓ Arrange sampling on a busy day when everything is working normally, unless you need to sample a particular process such as plant maintenance.

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- ✓ Ensure cleaning and maintenance processes are not overlooked as these can be a significant source of exposure.
  - ✓ Request personal samples in order to compare results with WELs.
  - ✓ For long term WELs (ie the 8-hr time-weighted average) the sampling period should be representative of the whole work shift and cover all activities.
  - ✓ Task specific measurements can be useful and can be compared with short-term WELs (15-min reference period).
  - ✓ Static samples can be used to identify if exposure controls are working effectively and where substances are escaping into the workplace.
  - ✓ Provide the consultant with any previous sampling results to allow comparisons to be made.
  - ✓ Demand contextual information, including detailed observations, with personal samples (ie the person, the task, the work pattern, the controls used and their performance, and any other information concerning the work environment).
  - ✓ Ask for comments eg if other routes of exposure could be important.
  - ✓ Your consultant should include all the monitoring results and interpret them (eg in terms of any identified risk and for any indication of control deterioration).
  - ✓ Ask for recommendations on how to maintain or improve the controls, on future monitoring needs, and where appropriate, for advice on health surveillance.

### What the consultant's report should include

#### Facts:

- ✓ background to, and the purpose of the measurement survey;
- ✓ the process measured, the work patterns, and the hazards involved;
- ✓ the control measures in place, and their performance;
- ✓ observations, photographs and diagrams;
- ✓ what measurements were taken (long and short-term), and how;
- ✓ how and where samples were analysed;
- ✓ exposure limits or exposure benchmarks, and whether these are protective of health;
- ✓ reference to relevant HSE and industry standards of good control practice; and
- ✓ sampling results, related to a plan of the work process. This should include how the 8-hour time-weighted average concentrations were calculated.

#### Opinion:

- ✓ identified exposure sources, discussion of sampling results, compliance with standards, the adequacy of controls and an assessment of the identified risk;
- ✓ identification of any tasks not measured that are likely to be an exposure source;
- ✓ any workers that could be exposed but did not undergo sampling;
- ✓ other matters of concern, and how to address them;

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- ✓ recommendations for improvement (eg action plan for controls, training, health surveillance); or
  - ✓ recommendations for further surveys to measure the effectiveness of any proposed changes.

### What is it likely to cost?

- ✓ Get an estimate. A professional survey will probably last at least a day, sometimes several days, and could cost a few thousand pounds.
- ✓ It depends a lot on the type of substances involved, and the amount of sampling and laboratory work.
- ✓ Do not pay for failures of sampling pumps or sample losses.
- ✓ Ensure that the survey will provide enough information for your purposes.

### Essential information

EH40/2005 Workplace exposure limits  
[www.hse.gov.uk/pubns/priced/eh40.pdf](http://www.hse.gov.uk/pubns/priced/eh40.pdf)

HSG173 Monitoring strategies for toxic substances (second edition)  
2006 <https://www.hse.gov.uk/pubns/priced/hsg173.pdf>

BS EN 689:2018 Workplace exposure. Measurement of exposure by inhalation to chemical agents. Strategy for testing compliance with occupational exposure limit values British Standards Institution  
ISBN 978 0 580 90536 0

### Further information

You can find the full COSHH essentials series at  
<http://www.hse.gov.uk/coshh/essentials/index.htm>

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>

British Occupational Hygiene Society (BOHS) Directory of Occupational Hygiene Services  
<https://www.bohs.org/information-guidance/>

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

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