

The logo for BOHS (British Occupational Hygiene Society) features the letters 'BOHS' in a bold, white, sans-serif font. The letter 'O' is stylized with a white circle inside it, set against a dark blue background.

British Occupational
Hygiene Society

The Chartered
Society for Worker
Health Protection

P403 Proficiency Qualification

Air Sampling and Fibre Counting (PCM)

Course Syllabus

Proficiency Module Syllabus

P403 – Air Sampling and Fibre Counting (PCM)

Teaching Aims

To provide candidates with the theoretical knowledge and practical ability to undertake air sampling in relation to asbestos and fibre counting to quantify respirable fibres using phase contrast microscopy.

Prior Knowledge and Understanding

Candidates for this course are expected to be aware of HSG 248 Asbestos: The Analysts' Guide (July 2021), and in particular Appendix 1, Fibres in air: sampling and evaluation of by phase contrast microscopy.

Candidates will preferably have prior experience of analysing fibre count samples and may already be participating in a quality control scheme.

In addition, candidates are expected to have had training to cover the core competencies outlined within the foundation material detailed within Table A9.1 of HSG248 Asbestos: The Analysts' Guide (July 2021). This may be achieved by In-house learning or through the P400 foundation module.

Learning Outcomes

On completion of this module, the candidate will be able to demonstrate the correct method for:

- Setting up air sampling equipment and collecting samples
- Mounting and clarifying the filter on a microscope slide
- Setting up the microscope and required quality checks
- Analysing samples and providing accurate fibre counts

Content

The syllabus is structured into five sections:

		Time Allocation
1	Air sampling equipment, sampling strategies and collection of samples	35%
2	Sample preparation and setting up of microscope	25%
3	Fibre counting and calculation of results	25%
4	Certificates and reporting results	7.5%
5	Quality control	7.5%

Note:

Reference is made in this syllabus to HSE guidance and other documentation. This list may not include the most up-to-date relevant publications from HSE and other sources and is intended as guidance for candidates only.

1 Air sampling equipment, sampling strategies and collection of samples (35%)

This section will provide suitable theoretical knowledge and practical training to ensure that the candidate is capable of identifying the correct sampling equipment, different sample types and strategies for their use, along with how to collect air samples.

In order to achieve this the candidate must be able to demonstrate both their knowledge and practical ability in the following:

- 1.0.1 Appropriate detailed knowledge of HSG248 (1), CAR 2012 (2) and L143 ACOP (3) with emphasis on the responsibilities and legal duties of all roles involved.

Understand their individual duties under Health and Safety at Work Act 1974 to carry out their work diligently so as not to create danger to others.

- 1.0.2 To set up sampling equipment for fibre monitoring including enclosure leak testing, background monitoring, personal monitoring for respirator zones, clearance air monitoring and reassurance sampling.

- 1.0.3 To explain the range of possible sampling strategies (e.g., the difference between sampling where there is work disturbing asbestos and when no disturbance work is involved).

- 1.0.4 To understand when monitoring is not required.

- 1.0.5 To understand types of sampling error and the techniques that can be used to ensure that they do not occur.

- 1.0.6 To fully understand the problems and challenges presented by the methods prescribed for air sampling and fibre counting.

- 1.0.7 To be able to demonstrate the ability to carry out the following tasks:

- Correct use of sampling heads/cowls/filters/rotameters and sampling pumps
- Calibration of sampling rate
- Use flowmeters(s), flow rate correction
- Appropriate locations for samples to be taken

2 Sample preparation and setting up of microscope (25%)

This section will provide suitable theoretical knowledge and practical training to ensure that the candidate is capable of preparing the samples collected, set

up a microscope ready for fibre counting along with having a good knowledge of the theory of phase contrast microscopy.

In order to achieve this the candidate must be able to demonstrate both their knowledge and practical ability in the following:

- 2.0.1 To prepare microscope slides following sampling.
- 2.0.2 To be able to set up a range of light microscopes and their illumination facilities.
- 2.0.3 To be able to demonstrate the use and adjustment of:
 - The stage micrometer
 - The Walton Beckett graticule
 - The NPL test slide

3 Fibre counting and calculation of results (25%)

This section will provide suitable theoretical and practical training to ensure that the candidate is capable of counting fibres in accordance with the recognised counting rules, (i.e., the WHO method as specified in HSG 248 (1), calculate the airborne fibre concentrations from the sampling data and then compare results with appropriate standards.

In order to achieve this the candidate must be able to demonstrate both their knowledge and practical ability in the following:

- 3.0.1 To be able to apply the method of fibre counting required by the Control of Asbestos Regulations (CAR) (2) and HSG248 Asbestos: The Analyst's Guide (1)
- 3.0.2 To understand and be able to apply the fibre counting rules consistently, in practice, to RICE and WHO standards.
- 3.0.3 To be able to carry out counts for a range of fibre types and densities and calculate fibre concentrations and refer to standards/control limits.
- 3.0.4 To understand how and be able to calculate fibre concentrations, fibre densities, limit of quantification, pooled samples, and time-weighted averages.
- 3.0.5 To be able to understand and explain the retention of filter requirements.
- 3.0.6 To understand when asbestos fibres may not predominate and where discrimination by electron microscopy would be more appropriate. Also, to understand If using SEM/TEM methods the additional competences that are required.

4 Certificates and reporting results (7.5%)

This section will provide suitable theoretical and practical training to ensure that the candidate is capable of producing a certificate of fibre count analysis and then communicating the results appropriately.

In order to achieve this the candidate must be able to demonstrate both their knowledge and practical ability in the following:

- 4.0.1 The requirements of ISO 17025 (4) for the production of test reports to ensure that all required information is included.
- 4.0.2 The importance and significance of producing accurate and adequate information within certificates.
- 4.0.3 The importance of recording detailed contextual information when collecting personal samples.
- 4.0.4 To be able appreciate the requirements and report to a range of client types in writing and verbally. Be able to complete a personal sampling report form as in the template in Appendix A6.3 of HSG 248 (1) including all the relevant contextual information.

5 Quality control (7.5%)

This section will provide suitable theoretical and practical training to ensure that the candidate has suitable knowledge and understanding of quality control requirements.

In order to achieve this the candidate must be able to demonstrate both their knowledge and practical ability in the following:

- 5.0.1 To be able to outline the difficulties of result consistency and the part played by UK and international schemes such as RICE and accreditation by UKAS to ISO 17025 (4) and other similar standards.
- 5.0.2 To understand the importance of internal and external audits and quality systems for reliability and accuracy and their own role in the system.
- 5.0.3 To be able to inspect and prepare/mount filters and plan for post-sampling handling and quality control tasks such as counting blank filters.
- 5.0.4 To understand the limitations on the numbers of samples which can be analysed and the requirements for additional quality control measures.

References and Further Reading

- 1) HSG248 (July 2021) Asbestos: The Analysts' Guide
- 2) Control of Asbestos Regulations (CAR) 2012
- 3) L143 (2013) Managing and working with asbestos. Control of Asbestos Regulations 2012, Approved Code of Practice and Guidance

- 4) ISO 17025 (2017) General requirements for the competence of testing and calibration laboratories

Suggested Further Reading:

Royal Microscopical Society Microscope Handbooks

- No 01: An Introduction to the Optical Microscope, Savile Bradbury
- No 23: Basic Measurement Techniques for Light Microscopy, Savile Bradbury

Course Length

This course will require at least **18** hours of study time, of which **14** hours will be taught (teaching and practical assessments) and **4** hours will be independent (in the candidates' own time).

Examinations and Assessment

Candidates are required to pass all of the following parts (A, B and C below) to be awarded this qualification.

A The Practical Assessment

The practical assessment must be conducted by the Tutor during the relevant part of the course for all candidates. This is to ensure that every candidate can demonstrate their individual ability and correct method for:

- Setting up air sampling equipment and collecting samples
- Mounting and clarifying the filter on a microscope slide
- Setting up the microscope and required quality checks
- Analysing samples and providing accurate fibre counts
- Understands the full range of air sampling strategies that may be required in relation to asbestos work

Further information about the practical assessment is published in the P403 Practical Assessment and Examination Guidance document.

B Written Examination

This is an open-book examination comprising of approximately 30 (120 Marks) short-answer questions illustrated by photographs and diagrams as appropriate to be answered in 120 minutes.

The examination covers sections ALL sections of the syllabus with achievable marks in proportion to the time allocation given on the front page of the syllabus and is overseen by a BOHS invigilator.

The overall pass mark is 55% with a requirement to reach at least 45% of the available marks in each section of the syllabus.

Further information is available in the P403 Examination Guidance document.

C Practical Examination

This is an open-book examination which requires candidates to count eight prepared microscope slides that are supplied by BOHS in a time allowance of 4 hours.

Candidates will be expected to achieve at least an equivalent to RICE category B performance or better on all slides with a one slide exception.

Further information about the practical examination and its marking schedule is published in the P403 Practical Assessment and Examination Guidance document.

Certification

Candidates who pass all the parts (A, B and C) within 12 months will be awarded a:

(P403) Proficiency Certificate in Air Sampling and Fibre Counting (PCM)

Related Courses

Details of further courses which would be beneficial to candidates following this career path.

- P403 Air Sampling and Fibre Counting (PCM) Refresher at appropriate intervals
- P401 Identification of Asbestos in Bulk Samples (PLM)
- P402 Surveying and Sampling Strategies for Asbestos in Buildings
- P402RPT Report Writing for Asbestos Surveys
- P404 Clearance Testing and the Requirements of a Certificate for Reoccupation
- P405 Management of Asbestos in Buildings