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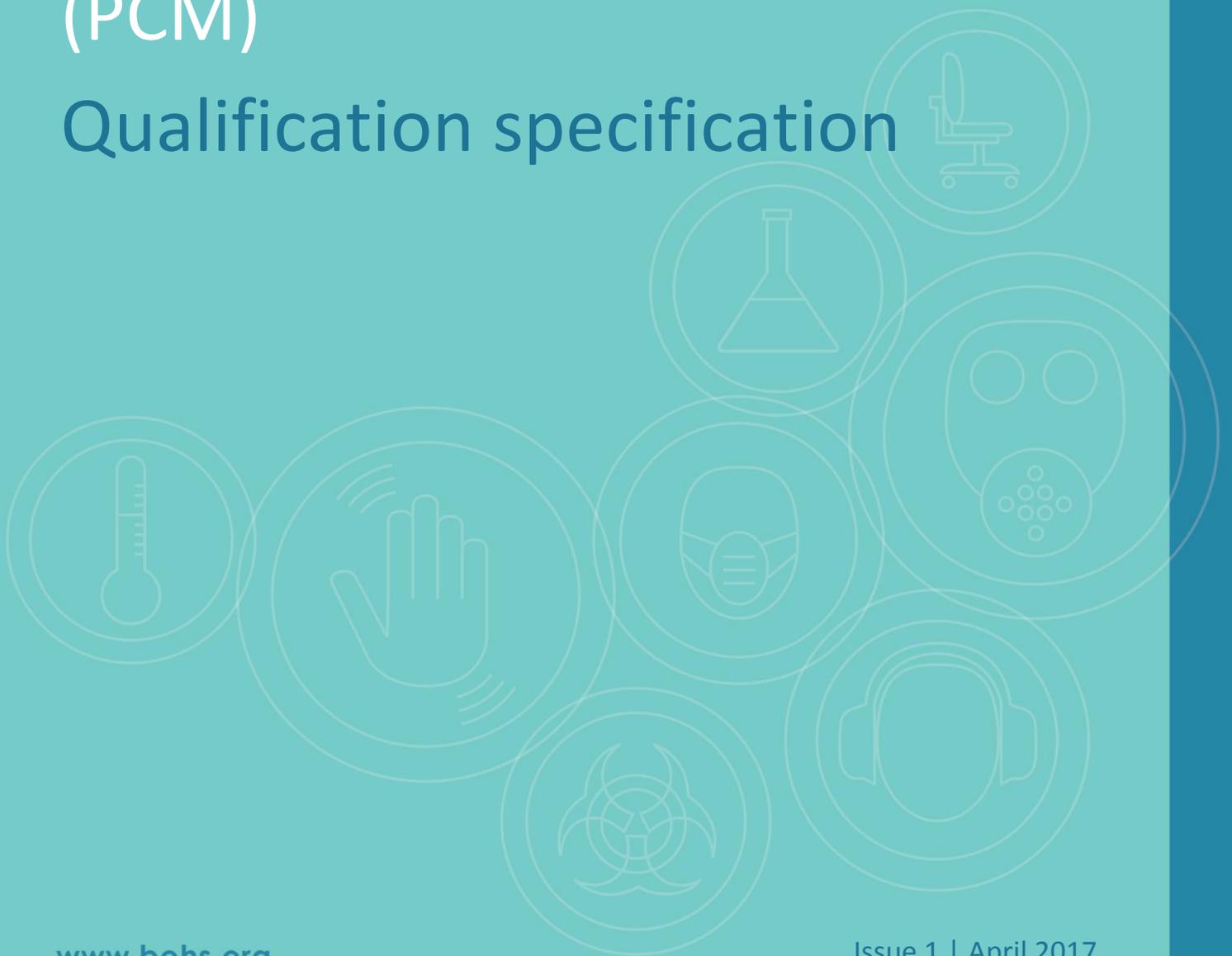
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THE STANDARDS

The industry standard for qualifications  
and courses in worker health protection

IP403 International Proficiency Qualification

# Asbestos Fibre Counting (PCM)

## Qualification specification



## Contents

		Page
<a href="#">Section 1</a>	<a href="#">About BOHS</a>	2
<a href="#">Section 2</a>	<a href="#">IP403 at a glance</a>	3
<a href="#">Section 3</a>	<a href="#">Background to the qualification</a>	4
<a href="#">Section 4</a>	<a href="#">Key features of the qualification</a>	5
<a href="#">Section 5</a>	<a href="#">Delivering the qualification</a>	6
<a href="#">Section 6</a>	<a href="#">Syllabus</a>	8
<a href="#">Section 7</a>	<a href="#">References and further reading</a>	10
<a href="#">Section 8</a>	<a href="#">Achieving the qualification</a>	11
<a href="#">Section 9</a>	<a href="#">Quality assurance</a>	18
<a href="#">Section 10</a>	<a href="#">Offering the qualification</a>	19
<a href="#">Section 11</a>	<a href="#">Other qualifications</a>	20
<a href="#">Appendix 1</a>	<a href="#">Formative Practical Assessment report</a>	22

## Section 1

### About BOHS

#### **BOHS - The Chartered Society for Worker Health Protection**

BOHS is the Chartered Society for Worker Health Protection. Our vision is to create a healthy working environment for everyone by preventing exposure to hazardous substances in the workplace.

Founded in 1953, we have developed over the last 60 years into a highly respected and influential body on workplace health issues, working closely with organisations in the UK and overseas to promote our vision. We are a registered charity, professional society and a member of the International Occupational Hygiene Association which is recognised as a non-government organisation by the International Labour Organisation (ILO) and the World Health Organization (WHO).

We were awarded a Royal Charter in 2013 in recognition of our pre-eminent role in protecting worker health.

BOHS is a membership organisation, open to anyone who has an interest in workplace health issues, and we have over 1800 members in 57 countries.

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#### **BOHS courses and qualifications – the quality choice**

We are the leading awarding body in our field. Our UK courses and qualifications are recognised and respected by independent agencies such as the Health and Safety Executive (HSE) and the United Kingdom Accreditation Service (UKAS), and further afield by industry and employers worldwide. Over 60,000 people have taken one of our qualifications through our network of training providers which offer engaging, challenging and practical courses.

Our courses and qualifications are overseen by a team of highly experienced professionals who are dedicated to developing the competence and career opportunities for the many thousands of people who play a key role in protecting worker health, in diverse fields such as asbestos, legionella and control technologies.

Information about all our courses and qualifications is available on our website:

[www.bohs.org/qualifications-training/bohs-qualifications/](http://www.bohs.org/qualifications-training/bohs-qualifications/)

## Section 2

### IP403 at a glance

#### What is the objective?

To provide candidates with theoretical and practical knowledge in the techniques of fibre counting of asbestos air samples, using phase contrast microscopy (PCM).

#### Who is it for?

Anyone residing in a country that does not have a recognised asbestos analysis qualification, and that undertakes fibre counting as part of their work.

#### What are the entry requirements?

- Understanding of the methods of sampling, analysis and clearance procedures for asbestos removal.
- Prior experience of analysing asbestos air samples.

#### What are the main subject areas?

- Setting up of microscopes.
- Filter preparation, fibre counting and outline of air sampling equipment.
- Calculation of results, quality control, reporting and communication.

#### How long does it take?

Normally 2 days as a set course.

#### What level is it?

Level 4 in the BOHS qualifications framework.

#### How do candidates pass it?

Candidates must pass three parts within 12 months:

- Formative practical assessment.
- Written theory examination.
- Practical examination.

## Section 3

### Background to the qualification

BOHS has provided asbestos proficiency qualifications in the UK for over 15 years, working closely with globally recognised bodies such as the Health and Safety Executive (HSE) to set educational standards and to spread best practice. In that time, over 45,000 candidates have taken a BOHS asbestos examination.

The risk to health from asbestos in buildings is a worldwide problem and, in response to increasing demand from outside the UK, BOHS is drawing on its expertise to develop a comprehensive suite of international asbestos qualifications for asbestos practitioners. The qualifications focus on all aspects of asbestos management and provide a taste of the different approaches used around the world.

IP403 *Asbestos Fibre Counting (PCM)* is the fourth in the suite of international asbestos qualifications. Asbestos analysts have a key role to play in helping to ensure that control measures for asbestos removal and remediation are effective, and that buildings are safe for re-occupation after asbestos removal works have been carried out. This qualification covers the full fibre counting process, from preparing filters through to reporting and evaluating findings.

## Section 4

### Key features of the qualification

#### Objective

The qualification is designed to improve the knowledge and skills required by asbestos analysts in line with approved methods for fibre counting, and to convey an understanding of the accuracy and limitations of these methods and the requirements for quality control.

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#### Target audience

The qualification is suitable for anyone who undertakes fibre counting as part of their work (e.g. laboratory analysts). It may also be useful for those who undertake other parts of asbestos clearance procedures (e.g. asbestos assessors) in order to build their level of knowledge.

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#### Entry requirements

Candidates for this course are expected to be aware of the methods for asbestos air sampling, analysis and clearance procedures.

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

Candidates also need good literacy and numeracy skills to complete the examinations.

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#### Age range

There is no age restriction on candidates taking the qualification, but different countries may impose minimum age requirements for working with asbestos.

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#### Level

The level of a qualification indicates the relative complexity and depth of knowledge and skills required to attain the qualification.

This qualification is set at level 4 in the BOHS qualifications framework. Different countries use different levels but this qualification is comparable to level 4 in the Regulated Qualifications Framework in England and level 5 in the European Qualifications Framework.

#### Fees

The examination fee for each candidate is published on the BOHS website:

[www.bohs.org/qualifications-training/examination-fees/](http://www.bohs.org/qualifications-training/examination-fees/)

## Section 5

### Delivering the qualification

#### Teaching and learning time

The IP403 course will normally run over two consecutive days and includes 11 hours of study time. This includes 9 hours taught (teaching and formative practical assessment) and two hours of independent study (in the candidate's own time).

The course can be delivered more flexibly, such as on one day per week over two weeks, but should still include 9 hours of teaching.

#### Tutors

The course should be taught by tutors who are experienced and qualified/certified asbestos practitioners or occupational hygienists. As a guide, tutors will typically have:

- At least three years' current experience in fibre counting;
- A recognised asbestos qualification or a professional occupational hygiene qualification/certification such as:
  - BOHS Certificate of Competence (Asbestos).
  - BOHS Certificate of Operational Competence.
  - BOHS Diploma of Professional Competence.
  - ABIH Certified Industrial Hygienist.
  - AIOH Certified Occupational Hygienist.
  - P403 – Fibre Counting (PCM).

This list is not necessarily exhaustive or definitive.

For delivery in New Zealand, tutors should also be a member of a HASANZ association.

#### Teaching resources

Training providers should have the following facilities and equipment:

- Counting microscope with all relevant calibration and set-up materials.
- Slide making facilities; suitable examples to demonstrate counting methods.
- Projection microscope for teaching purposes.

## Support for teaching and learning

BOHS provides:

- A comprehensive Student Manual, which covers the full range of subject areas included in the qualification.
  - Sample examination questions for tutors.
- 

## Language

The course may be delivered in any language but the Student Manual and the examinations are provided in English only.

Candidates will need the necessary English language skills to benefit from taking the qualification. Further information about English language proficiency is available on the IELTS website: <http://www.ielts.org/default.aspx>

## Section 6

### Syllabus

The qualification is structured into four sections, each with an indicative time allocation:

Section		Time allocation
1	Introduction and setting up of microscope	10%
2	Filter preparation, fibre counting and outline of air sampling equipment	25%
3	Calculation of results, quality control, reporting and communication	15%
4	Practical work	50%

#### 1 Introduction and setting up of microscope (10%)

##### 1.1 Introduction

1.1.1 Outline of asbestos types and their health effects.

##### 1.2 Setting up of microscope

1.2.1 Describe the theory of phase contrast microscopy.

1.2.2 Use of light microscopy, setting up of Koehler or Koehler type illumination, calibration of stage micrometer and use of test slides.

1.2.3 Demonstrate and use of the Walton-Beckett graticule, stage micrometer and NPL test slide (or equivalent).

1.2.4 Candidates must be given the opportunity to set up various makes of microscope used in this work, as well as to count slides of known quality such as those used in the UK Regular Inter-laboratory Counting Exchange (RICE) scheme (or equivalent for country).

#### 2 Filter preparation, fibre counting and outline of sampling equipment (25%)

2.0.1 Outline of air sampling trains and their application for monitoring of airborne fibre concentrations.

2.0.2 Handling and preparation of filters, and counting of fibres in accordance with the recognised counting rules (i.e. the World Health Organisation [WHO] method).

2.0.3 Discussion of the limitations of the methods together with understanding of accuracy, precision and systematic differences.

### **3 Calculation of results, quality control, reporting and communication (15%)**

- 3.0.1 Calculation of airborne fibre concentrations from fibre count data and comparison of results with appropriate standards.
  - 3.0.2 Examination of the reliability of results in relation to quality control schemes such as UKAS, RICE, PAT, NAP, ISO, European and other standards for Good Laboratory Practice (GLP).
  - 3.0.3 Necessity for internal quality schemes (i.e. counting of blank filters and counting audits).
  - 3.0.4 Describe the requirements for formal reporting of and communication of analytical results.
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### **4 Practical work (50%)**

Practical work must be carried out to provide candidates with all practical knowledge in carrying out the following:

- Preparation of microscope slides following sampling.
- Microscope set-up and an understanding of the counting rules.
- Fibre counting for a range of fibre densities and types.

## Section 7

### References and further reading

A comprehensive Student Manual is available as part of the IP403 course.

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#### Useful websites

The following websites include useful information about conducting asbestos assessments in different countries:

Australia

[www.safeworkaustralia.gov.au/sites/SWA](http://www.safeworkaustralia.gov.au/sites/SWA)

New Zealand

[www.business.govt.nz/worksafe/](http://www.business.govt.nz/worksafe/)

Great Britain

[www.hse.gov.uk/asbestos](http://www.hse.gov.uk/asbestos)

United States of America

[www.cdc.gov/niosh/](http://www.cdc.gov/niosh/)

## Section 8

### Achieving the qualification

Candidates are required to pass three mandatory components to be awarded the qualification:

#### Assessment

- Formative practical assessment (FP).

#### Examinations

- Written theory examination (WT).
- Practical examination.

### Assessment

#### Formative practical assessment

Candidates are required to have the knowledge and skills to carry out fibre counts using phase contrast microscopy (PCM).

The formative practical assessment requires candidates to demonstrate their ability to:

- Correctly mount and clear filters
- Prepare slides
- Set up the microscope
- Achieve a good level of understanding of the fibre counting rules.

The formative practical assessment is designed to enable candidates to demonstrate that they have achieved the relevant asbestos analysis skills, by carrying out a number of practical tasks. All candidates must undertake the tasks at an appropriate time during the course under the supervision of the course tutor. The tutor may be assisted by other appropriately qualified and experienced people if necessary.

The assessment is open-book and candidates are permitted to access written reference materials and written procedures during the tasks, but not electronic databases.

The course tutor is permitted to support candidates who are experiencing difficulties in carrying out one or more of the tasks, such as by providing verbal feedback or by demonstrating correct techniques. However, to complete the assessment, candidates must demonstrate a satisfactory level of proficiency in all tasks independently and without support.

## Equipment

Equipment required for the assessment includes:

- Acetone.
- Coverslips.
- Filter clearing equipment (i.e. acetone vaporiser).
- Filters.
- Flat-headed tweezers.
- Glycerol triacetin.
- Microscopes and calibration/test slides for set up.
- Slides.

## The practical tasks

The following four elements must be included in the formative practical assessment:

### Element 1 - Filter clearance procedure

Candidates must demonstrate:

- Use of acetone hot block method to clear filters.
- Preparation of microscope slides using glycerol triacetin as mounting medium.

### Element 2 - Microscope set up

Candidates must demonstrate:

- Adjustment to obtain Köhler illumination.
- Use of Walton-Beckett graticule.
- Use of stage micrometer.
- Use of NPL test slides.
- Use of phase telescope (or appropriate alternative) to check phase ring alignment.

### Element 3 - Counting fibres

Candidates must demonstrate their knowledge and application of fibre counting rules.

### Element 4 - Calculation of results

Candidates must demonstrate:

- Use of formulae to convert fibre counts into airborne fibre concentrations.
- Knowledge and application of limits of quantification.

## Marking and reporting

The course tutor that assesses the candidates must complete a Formative Practical Assessment Report Form for each candidate (see Appendix 1). The report must clearly show if each candidate has achieved a satisfactory or unsatisfactory level of proficiency for each assessment element, and should include other comments about the candidate's performance, such as weaknesses that were corrected and key points to take into asbestos practice.

Candidates are required to achieve a satisfactory level of proficiency for each element in order to successfully complete the assessment.

A copy of the relevant Report should be given to the candidate.

### Results

The results for each candidate must be sent to BOHS within five working days after the end of the course.

### Re-sits

The formative practical assessment is not time-constrained, and it is expected that candidates who meet the entry requirements for the qualification will pass the assessment during the course. However, candidates are permitted to re-sit the assessment at a later date if required.

Candidates who do not complete the tasks are permitted to take the written and practical examinations, but will not be awarded the qualification until they successfully complete the formative practical assessment.

## Written theory examination

The written theory examination usually takes place immediately after the course. It enables candidates to demonstrate that they have attained the required breadth and depth of knowledge in the techniques of fibre counting and use of microscopes.

The examination comprises 20 short-answer questions, to be answered in one hour. Short-answer questions require candidates to give brief answers, sometimes as bullet points or calculations. All questions are worth 4 marks and candidates may be awarded between 0 and 4 marks per question. Candidates should attempt all questions as no marks are deducted for incorrect answers.

The pass mark is 50%.

The examination covers sections 1 to 3 of the syllabus in proportion to the time allocation given for each section. This gives a question allocation as follows:

Section		Number of questions
1	Introduction and setting up of microscope	4
2	Filter preparation, fibre counting and outline of air sampling equipment	10
3	Calculation of results, quality control, reporting and communication	6

The sections are clearly marked in the examination paper.

The written theory examination is a closed-book examination, which means that candidates are not permitted to have access to any material.

## General examination information

### Invigilation

The written examination is carried out in controlled conditions, to help ensure that all candidates demonstrate their true level of attainment.

The training provider must appoint a competent invigilator to ensure that the examinations are conducted properly and fairly. Full details about the examination procedure are provided in the BOHS 'Handbook for Invigilators for International Qualifications'.

### Marking and results

All examination papers are marked by BOHS. Borderline fail results are automatically re-marked by a second marker.

Candidates receive their results in writing from BOHS. The results are reported as pass or fail plus a percentage.

Training providers are sent a list of results for all candidates on a course.

### Feedback

Candidates receive feedback on their examination performance for both examinations. For example, the feedback for a written theory examination in which a candidate scored 78% would be shown as follows:

Syllabus Area		Result	
1	Introduction and setting up of microscope	8/16	(50%)
2	Filter preparation, fibre counting and outline of air sampling equipment	30/40	(75%)
3	Calculation of results, quality control, reporting and communication	24/24	(100%)
<b>Total</b>		<b>62/80</b>	<b>(78%)</b>

Training providers receive feedback on the performance of all candidates. For example, the feedback for a course with six candidates would be as follows:

Written Exam Performance against syllabus		Number of candidates in each scoring band		
		0-49%	50-75%	76-100%
Written Theory	1: Introduction and setting up of microscope	1	4	1
Written Theory	2: Filter preparation, fibre counting and outline of air sampling equipment	0	3	3
Written Theory	3: Calculation of results, quality control, reporting and communication	2	4	0

### Resits

Candidates may re-sit the examination, but they pass within 12 months of the original sitting.

### Practical examination

Candidates are required to count eight prepared microscope slides and achieve at least the equivalent to RICE category B performance (or better) on all slides with one exception. The WHO counting rules must be used.

The examination is open-book, which means that candidates may have access to relevant reference material during the examination. However, candidates are not permitted to access electronic databases or electronic communication devices such as mobile phones, tablets or computers. Additionally, candidates are not permitted to communicate with each other.

### Facilities and equipment

The practical examination requires training providers to provide suitable facilities, including an appropriate examination room and counting microscopes.

### Invigilation

The practical examination must be carried out in controlled conditions, to help ensure that all candidates demonstrate their true level of attainment and to prevent communication between candidates. Training providers must appoint a competent specialist invigilator for each examination to check that the facilities and equipment are fully adequate for the purpose before and during each examination and to supervise the candidates.

Specialist invigilators are authorised to postpone an examination if the facilities and equipment are not adequate.

### Sample slides

Slides are provided by BOHS for each examination, normally via post to the training provider one week before the examination. The slides arrive in a single padded envelope containing a box with a set of eight slides. Training providers must keep the slides secure and only specialist invigilators are authorised to open the envelope.

Each set of slides is suitable for examinations with up to eight candidates, and will contain two each of slides designated as <<63.7, <63.7, >63.7 and >>63.7 fibres/mm<sup>2</sup>. These represent an appropriate diversity of fibre densities to fully test the candidates' abilities.

Where more than eight candidates are being examined at the same time, a second set of slides is normally supplied.

Where the candidates are split into two or more groups and are examined sequentially, specialist invigilators will ensure that sample numbers and other information is not passed from group to group.

Where groups are examined on different days, different sets of slides will be used in order to maintain security. The BOHS office must be advised of this requirement in advance so that multiple sets of slides can be provided. These will be labelled for the relevant dates.

### **Exam documentation**

Specialist invigilators ensure that candidates understand the examination requirements, and that candidates complete all relevant documentation, including:

- Examination attendance record.
- Sample access record sheet.
- Candidate practical examination answer form.
- Candidate information form (if required).

Specialist invigilators are responsible for returning the completed documentation to BOHS.

### **Marking and results**

Grading of the slide counting results is carried out against a full and detailed marking scheme.

The counts are graded as being in band A, band B or outside band B. Errors where candidates record the wrong slide number, analyse the same slide twice or fail to analyse a slide are classified as 'supercritical' errors and will be graded as outside band B. Candidates must achieve 7 out of the 8 samples in band B or better to gain a satisfactory performance rating. Two or more samples outside band B automatically results in a fail.

Examination results are sent to candidates by post and results are sent to training providers after each examination.

### **Feedback**

Feedback provided to candidates indicates the grading of the results for individual samples.

### **Return of slides**

Training providers are responsible for returning slides to BOHS by special delivery within two working days of the date of the examination.

## **Certification**

Candidates who pass all the assessment parts within 12 months will be awarded an **International Proficiency Certificate in IP403 - Asbestos Fibre Counting (PCM)**

## Section 9

### Quality assurance

#### Internal quality assurance

Training providers must operate an internal quality assurance system which evaluates and improves the delivery of the qualification.

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#### External quality assurance

BOHS undertakes desk-based reviews of documents, including teaching materials, and conducts surveys of candidates. We also may inspect training providers.

This qualification is not included in the mandatory asbestos training provider inspection scheme.

## Section 10

### Offering the qualification

#### Approved training providers

Please complete and return the 'Application Form for Additional Qualifications' to [qualifications@bohs.org](mailto:qualifications@bohs.org). The form is available on the BOHS website.

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#### New training providers

Please send an email to [qualifications@bohs.org](mailto:qualifications@bohs.org) expressing your interest in offering the qualification and we will advise you about the approvals process.

## Section 11

### Other qualifications

Candidates who achieve this qualification may wish to take one of the following qualifications:

#### IP402 Surveying and Sampling Strategies for Asbestos in Buildings

##### Objective

The objective of IP402 is to improve the knowledge and skills required by asbestos surveyors up to a standard which is recognised as reducing ill health by minimising the risk of exposure to airborne asbestos fibres.

##### Target audience

The qualification is suitable for anyone who is:

- Required to survey buildings for asbestos as part of their work;
- Considering a career in asbestos surveying;
- Responsible for managing surveyors and surveying teams.

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#### IP402RPT Report Writing for Asbestos Surveys

##### Objective

The completion of clear and comprehensive asbestos survey reports for clients is an important part of an asbestos surveyor's work. This qualification recognises that asbestos surveyors have the necessary knowledge and skills to write reports.

##### Target audience

The qualification is for asbestos surveyors who have completed IP402.

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#### IP404 Air Monitoring, Clearance Inspections and Reoccupation Following the Removal of Asbestos

##### Objective

For asbestos removal or remediation projects, an independent asbestos assessor should check that control measures are effective and that the affected area is safe to re-occupy at the end of the project. This qualification covers the skills and knowledge an asbestos assessor needs, from air monitoring and clearance testing through to reporting findings and issuing a clearance certificate.

##### Target audience

The qualification is suitable for anyone who:

- Undertakes clearance inspections and air monitoring of asbestos as part of their work (e.g. asbestos assessor);
- Issues clearance certificates after asbestos clearance procedures.

## **IP405 Management of Asbestos in Buildings**

### **Objective**

The qualification is designed to provide the background knowledge required to procure good quality asbestos surveying, removal, and analytical services and to monitor the standard of the services by understanding the work procedures.

### **Target audience**

The qualification is for anyone who:

- Manages asbestos in buildings;
- Procures asbestos-related services;
- Is a dutyholder/PCBU or provides assistance to them in the discharge of their responsibilities;
- Has an analytical or surveying background and is looking to progress into asbestos management.

## Appendix 1

### Formative Practical Assessment Report

#### IP403 – Asbestos Fibre Counting (PCM)

<b>Training provider</b>			
<b>Course start date</b>		<b>Course End Date</b>	
<b>Location of course</b>			
<b>Name of candidate</b>		<b>Date of Birth</b>	
<b>Date of assessment</b>			

<b>Assessment element</b>		<b>Tutor comment on level of proficiency<sup>1</sup></b>
<b>1</b>	<b>Filter clearance procedure</b>	
<b>2</b>	<b>Microscope set up</b>	
<b>3</b>	<b>Counting fibres</b>	
<b>4</b>	<b>Calculation of results</b>	

I certify that the above candidate has been assessed in accordance with BOHS requirements and has achieved the level of proficiency for each element as shown.

<b>Name of tutor</b>		<b>Signature of tutor</b>	
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<sup>1</sup>Tutor must enter 'Satisfactory' or 'Unsatisfactory' for each element, with additional comments if necessary relating to the candidate's ability and expertise in that element.

British Occupational Hygiene Society 2017

Information in this Qualification Specification is correct at the time of issue but may be subject to change.

**BOHS**

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