

BOHS

British Occupational
Hygiene Society

The Chartered
Society for Worker
Health Protection

P903 Proficiency Qualification

**Legionella - Management and
Control of Evaporative Cooling
and Other High Risk Industrial
Water Systems**

Qualification Specification

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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 65 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.

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 50,000 people have taken one of our qualifications through our network of training providers which offer engaging, challenging and practical courses.

Our 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 from our website:

www.bohs.org/qualifications-training/bohs-qualifications/

Section 2

P903 at a glance

What is the objective?

To provide an overview of legionella bacteria risk, and how it can be controlled in evaporative cooling and other high-risk industrial type water systems in compliance with regulatory requirements.

Who is it for?

- Process and cooling water system technicians and operatives.
- Responsible persons for industrial type water systems (e.g. building and facilities managers, duty holders, maintenance staff).
- Legionella risk assessors and consultants.
- Occupational hygienists and health and safety managers.

What are the entry requirements?

Before taking P903, candidates must:

- Have successfully completed *P901 – Legionella - Management and Control of Building Hot and Cold Water Services*.
- Have some experience of working with industrial or evaporative cooling systems.
- Have a working knowledge of HSE guidance documents *L8* and *HSG274 (Pts 1-3)*

What are the main subject areas?

- ☒ Legislation and guidance.
- ☒ Cooling tower design and operation.
- ☒ Risk assessment.
- ☒ Water treatment.
- ☒ Operational control.
- ☒ Other risk systems.
- ☒ Record keeping.

How long does it take?

1 day.

What level is it?

Level 4 in the BOHS qualifications framework.

How do candidates pass it?

Candidates must pass a Written Theory examination and a workplace report assignment.

Section 3

Background to the qualification

BOHS aims to protect worker health through promoting the science and practice of occupational hygiene. By identifying and controlling hazardous substances in the workplace, we can reduce the levels of occupational ill health.

Legionella proliferation is a serious problem in both domestic and non-domestic water systems. Exposure to legionella bacteria through inhalation of contaminated water droplets can result in serious health effects for workers, which in some cases can be fatal. The Legionnaires' disease outbreak in Edinburgh in 2012 highlighted just how serious it can be, causing four deaths and 92 cases of serious illness. Evaporative cooling systems have been involved in the majority of large outbreaks of Legionellosis throughout the world.

BOHS' suite of legionella qualifications gives candidates the knowledge to identify and control legionella growth risk in water systems, to a standard which reduces occupational ill health. *P903 - Legionella – Management and Control of Evaporative Cooling and other High Risk Industrial Water Systems* teaches candidates about the operating characteristics and properties of these devices which make them potentially high-risk systems; how these risks can be identified and managed by trained and competent operators; and the control measures need to be implemented to ensure continued safe operation.

Section 4

Key features of the qualification

Objective

The qualification is designed to improve the knowledge required by water systems operatives, up to a standard which is recognised as preventing ill health by minimising the risk of exposure to legionella bacteria.

Target audience

The qualification is suitable for anyone who is:

- Responsible for maintaining evaporative cooling systems and other industrial type water systems. This includes:
 - Water system technicians and operatives.
 - Building and facilities managers.
 - Duty holders and other responsible persons.
 - Maintenance staff.
- Responsible for controlling legionella bacteria risks or for controlling health risks in the workplace. This includes:
 - Legionella consultants.
 - Occupational hygienists.
 - Health and safety practitioners or health and safety managers.

Entry requirements

Candidates must have successfully completed *P901 – Legionella - Management and Control of Building Hot and Cold Water Services*. This pre-requirement is waived where both P901 and P903 courses are run on consecutive days or as a combined course.

Candidates are also expected to have a working knowledge of the following guidance documents:

- L8 (current version), Legionnaires' disease: The control of legionella bacteria in water systems, Approved Code of Practice and guidance, HSE.
- HSG274 (current version), Legionnaires' disease - Technical guidance Part 1: The control of legionella bacteria in evaporative cooling systems, HSE
- HSG274 (current version), Legionnaires' disease - Technical guidance Part 3: The control of legionella bacteria in other risk systems, HSE

Age range

Tel: +44(0)1332 298101

Email: qualifications@bohs.org

Web: www.bohs.org

There is no age restriction on candidates taking the qualification.

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, equivalent to NVQ Level 4 and HNC.

Achievement at Level 4 reflects the ability to identify and use the relevant understanding, including methods and skills to address problems that are well defined but complex and non-routine. It includes taking responsibility for overall course of action as well as exercising autonomy within fairly broad parameters. It also reflects understanding of different perspectives and approaches within an area of study or work.

Fees

The examination fee for each candidate is published on the BOHS website:
www.bohs.org/qualifications-training/examination-fees/

Section 5

Delivering the qualification

Teaching and learning time

The P903 course normally runs on one day and includes 6 hours of teaching.

Tutors

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

- At least three years' current experience in controlling legionella bacteria risk;
- A recognised legionella qualification or a professional occupational hygiene qualification/certification such as:
 - BOHS Certificate of Competence (Legionella);
 - BOHS Certificate of Operational Competence;
 - BOHS Diploma of Professional Competence.

This list is not necessarily exhaustive or definitive.

Teaching resources

Training providers must have drawings and photographs of relevant installations, water sampling and test equipment.

Support for teaching and learning

BOHS provides:

- Sample examination questions for tutors.
 - Report writing guidance for candidates.
-

Language

The examinations are provided in English only.

Section 6

Syllabus

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

	Topic	Time allocation
1.	Legislation and guidance	5%
2.	Cooling tower design and operation	15%
3.	Risk assessment	20%
4.	Water treatment	20%
5.	Operational control	15%
6.	Other risk systems	20%
7.	Record keeping	5%

1. Legislation and guidance (5%)

Educational objectives

Candidates should have a detailed understanding the key pieces of legislation and guidance which underpin best working practice in managing and controlling legionella risk.

- 1.0.1 Acts of Parliament.
- 1.0.2 Approved codes of practice, HSE guidance notes, regulations, British Standards. Other industry-accepted good practice sources of information.

2. Cooling tower design and operation (15%)

Educational objectives

Candidates should understand the different types and key components of open and closed circuit evaporative cooling systems and their principal functions, including in general terms the operation of drift eliminators. They should also learn about the use of alternative lower-risk means of achieving heat rejection.

- 2.0.1 Types of cooling towers: natural draught, evaporative condensers, evaporative fluid condensers, open evaporative cooling towers.
- 2.0.2 Heat rejection mechanism.
- 2.0.3 The principal components of a cooling tower water system.

3. Risk assessment (20%)

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Web: www.bohs.org

Educational objectives

Candidates should have a detailed practical and theoretical understanding of how to carry out a risk assessment of a system and the risk assessment approach to fill pack removal for cleaning, including means of appraising cleanliness.

- 3.0.1 Roles of the named duty holder and responsible person.
- 3.0.2 Key components of the risk assessment including system schematic.
- 3.0.3 Adiabatic enhancement of dry coolers and hybrid coolers.
- 3.0.4 General design considerations.
- 3.0.5 Risk assessment-led approach to fill pack removal for cleaning.

4. Water treatment (20%)

Educational objectives

Candidates should be able to analyse, interpret and evaluate in general terms the key elements of a chemical treatment regime for open evaporative cooling systems, the hardness cycle, base exchange softening, corrosion control, the effect of increasing pH on halogen biocides, concentration factor, bleed and half life.

- 4.0.1 Routine cleaning and disinfection.
- 4.0.2 Scale control, the hardness cycle and base exchange softening.
- 4.0.3 Corrosion control including common corrosion inhibitors.
- 4.0.4 Dissolved solids control including concentration factor and system bleed.
- 4.0.5 Microbiological control including oxidising/non-oxidising biocides, alternative treatment techniques.

5. Operational control (20%)

Educational objectives

Candidates should fully understand all the requirements for regularly monitoring for legionella risk in water systems, and how to carry out routine testing.

- 5.0.1 COSHH requirement for elimination.
- 5.0.2 Weekly, monthly, quarterly, six monthly, and annual tasks.
- 5.0.3 Precautions for units on standby.
- 5.0.4 Free cooling.
- 5.0.5 Requirements for monitoring for legionella bacteria.
- 5.0.6 Routine bacteriological testing with assessment of limitations of this data and control levels.

- 5.0.7 Records: the detail required and retention.

6. Other risk systems (20%)

Educational objectives

Candidates should be able to analyse, interpret and evaluate the legionella risks posed by other industrial water systems, and implement appropriate control regimes. This includes emergency water systems (fire, safety showers, eye wash stations); stand alone or fixed washing devices (for vehicles, components, products or other items); air humidification systems; fogging and misting devices; air scrubbers.

The techniques used for cooling towers and evaporative condensers would be extended to show how they would be directly applied to other high risk systems. This should include systems such as:

- 6.0.1 Industrial spray humidifiers and misting systems.
- 6.0.2 Air Handling Units (AHU's) and humidifier systems.
- 6.0.3 Deluge and sprinkler systems and other fire suppression systems.
- 6.0.4 Emergency showers.
- 6.0.5 Wet scrubbers used for treatment of fume, dust, paint, gas etc.
- 6.0.6 Vehicle and component wash down systems including power jet wash systems.
- 6.0.7 Machine and lathe cooling systems.
- 6.0.8 Water softeners, and other such systems wherever a respirable water based aerosol can be created.

7. Record keeping (5%)

Educational objectives

Candidates should fully understand what records they are required to keep for their water systems, in order to comply with legislation.

- 7.0.1 Regulatory requirements for record keeping.

Section 7

References and further reading

1. BS 7592 (2008), Sampling for Legionella bacteria in water systems - Code of practice, BSI

2. BS 8580 (2010), Water quality - Risk assessments for Legionella control - Code of practice, BSI

3. HSG274 (2014), Legionnaires' disease - Technical guidance Part 1: The control of legionella bacteria in evaporative cooling systems, HSE

4. HSG274 (2014), Legionnaires' disease - Technical guidance Part 3: The control of legionella bacteria in other risk systems, HSE

5. INDG 458 (2012), Legionnaires' disease: A brief guide for dutyholders, HSE

6. L8 (2013), Legionnaires' Disease: The control of legionella bacteria in water systems - Approved Code of Practice and guidance on regulations (4th edition), HSE

HSE guidance is reviewed and revised periodically. Training providers should check that the publications listed above are the current versions.

Useful websites

All the Health and Safety Executive (HSE) publications listed above are available as free downloads from the HSE website: www.hse.gov.uk/legionnaires

Section 8

Achieving the qualification

Candidates are required to pass two elements in order to be awarded the qualification:

- Written Theory examination.
- Field assessment report.

Written Theory examination

The Written Theory examination enables candidates to demonstrate that they have attained the breadth and depth of knowledge which necessarily underpins good legionella risk assessment and control practice for evaporative cooling and other industrial water systems.

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 a maximum of 4 marks. Candidates should attempt all questions as no marks are deducted for incorrect answers.

The pass mark is 50%. The examination covers sections 1 to 7 of the content if the qualification in proportion to the time allocation given for each section. This gives a question allocation as follows:

Section		Number of questions
1	Legislation and guidance	1
2	Cooling tower design and operation	3
3	Risk assessment	4
4	Water treatment	4
5	Operational control	3
6	Other risk systems	4
7	Record keeping	1

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.

Invigilation

The examination is carried out in controlled conditions, to help ensure that all candidates

demonstrate their true level of attainment. BOHS will appoint an independent invigilator to oversee the examination.

Marking and results

All examination papers are marked by BOHS. Candidates receive their results in writing from BOHS. The results are reported as pass or fail plus a percentage.

Borderline fail results are automatically re-marked by a second marker. Training providers are sent a list of results for all candidates on a course.

Feedback

Candidates receive feedback on their examination performance. For example, the feedback for a Written Theory examination in which a candidate scored 60% would be shown as follows:

Syllabus Area		Result	
1	Legislation and guidance	4/4	(100%)
2	Cooling tower design and operation	6/12	(50%)
3	Risk assessment	16/16	(100%)
4	Water treatment	8/16	(50%)
5	Operational control	12/12	(100%)
6	Other risk systems	0/16	(0%)
7	Record keeping	2/4	(50%)
Total		48/80	(60%)

Training providers receive feedback on the performance of all candidates.

Written Exam Performance against syllabus		Number of candidates in each scoring band		
		0-49%	50-75%	76-100%
Written Theory	1. Legislation and guidance	1	6	1
Written Theory	2. Cooling tower design and operation	2	5	1
Written Theory	3. Risk assessment	2	6	0
Written Theory	4. Water treatment	1	5	2
Written Theory	5. Operational control	1	5	2
Written Theory	6. Other risk systems	1	5	2
Written Theory	7. Record keeping	1	4	3

Resits

Candidates may re-sit the Written Theory examination, but must pass within 12 months of the original examination date in order to achieve the qualification.

Field assessment report

Candidates must demonstrate that they have successfully carried out one field assessment of an industrial water system. They must submit a report which shows the examiner that they have the required knowledge to assess and control the legionella risks in evaporative cooling systems and industrial water systems.

The report submitted must be the candidate's own work. Where the work is carried out under supervision, the supervisor must sign a statement to confirm that the work is that of the candidate only.

Report contents

The assessed water system must involve equipment used in industrial water systems, such as:

- Cooling towers
- Industrial component or unit washing, including power jet cleaners
- Ultrasonic cleaners
- Industrial spray humidifiers and misting systems (anti-static control)
- Air Handling Units (AHU's) and humidifier systems
- Deluge and sprinkler systems, and other fire suppression systems
- Emergency showers
- Wet scrubbers used for treatment of fume, dust, paint, gas etc.
- Machine and lathe cooling systems
- Water softeners (and other such systems where a respirable water-based aerosol can be created)

The assessed water system should have a potential legionella growth risk if mismanaged, and the report should fully consider the implications of what would happen if there was a Legionellosis outbreak.

The report must be as detailed as possible, covering how the water system was inspected, analytical results from measurements taken, and recommendations after the assessment. A report that only consists of typed-up field notes (e.g. a field log or sampling list) would not be accepted, as it would not go into sufficient detail about how the water system was evaluated or how the study was carried out. The length of the report should be a minimum of four typed A4 pages. There is no restriction on the maximum length of the report.

More detailed advice of how to submit reports is provided in the *P903 - Report requirements for candidates* document, which is available on the BOHS website.

Marking and results

Candidates must submit their report to BOHS within 12 months of the date they sat the Written Theory examination (the examination is normally on the same date as the training course). Candidates who do not submit their report within this timeframe will need to re-sit the Written Theory examination.

Candidates also must complete a Certificate of Authorship Form, and submit it to BOHS along with their report. This can be downloaded from the BOHS website.

Candidates will receive their result in writing from BOHS. The result is given as a pass or fail. If a

report has not passed, feedback is sent to the candidate with further information (such as amend and re-submit report, provide new report, etc.) Reports may only be re-submitted twice; after this time, a new report must be submitted with an additional fee of £35.

Certification

Candidates who pass both assessments will be awarded a Proficiency certificate in *P903 - Legionella – Management and Control of Evaporative Cooling and other High Risk Industrial Water Systems*.

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.

External quality assurance

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

Section 10

Offering the qualification

Approved Training Providers

Please complete and return the 'Application to Offer Additional Qualifications' form to qualifications@bohs.org. The form is available on the BOHS website.

New training providers

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

Section 11

Other courses and qualifications

Candidates who achieve this qualification may also wish to take the following qualification:

P904 - Legionella – Management and Control in Leisure, Display, Therapy and other Non-Industrial Water Systems

Objective

This qualification provides candidates with an overview of legionella bacteria risk and how it can be controlled in leisure, display, therapy and other non-industrial water systems.

Target audience

This qualification is aimed at anyone who is responsible for assessing and controlling legionella risk in non-industrial water systems. This includes:

- Water system operatives and technicians.
- Building facilities managers and maintenance staff.
- Duty holders and other responsible persons.
- Legionella consultants.
- Health and safety practitioners.
- Occupational hygienists.

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

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