BS 7592:2008

BSI British Standards

Sampling for Legionella bacteria in water systems – Code of practice

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The following BSI references relate to the work on this standard:
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Summary of pages
This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 36, an inside back cover and a back cover.

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Publishing information

This British Standard is published by BSI and came into effect on 30 November 2008. It was prepared by Subcommittee EH/3/4, *Microbiological methods*, under the authority of Technical Committee EH/3, *Water quality*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This British Standard supersedes BS 7592:1992, which is withdrawn.

Information about this document

This is a full revision of the standard, and introduces the following principal changes:

This document makes a clearer distinction between routine and incident sampling.

It provides a clearer rationale for routine sampling, including newly-recognised sources, risk assessment, surveying and sample points.

It revises acceptable transport times to account for more quantative results and sampling/transport subcontracting.

It takes account of new standards documents for water sampling and analysis.

Hazard warnings

WARNING. This British Standard calls for the use of substances and/or procedures that can be injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage

Use of this document

As a code of practice, this British Standard takes the form of guidance and recommendations. It should not be quoted as if it were a specification and particular care should be taken to ensure that claims of compliance are not misleading.

Any user claiming compliance with this British Standard is expected to be able to justify any course of action that deviates from its recommendations.

It has been assumed in the preparation of this British Standard that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

Presentational conventions

The provisions in this standard are presented in roman (i.e. upright) type. Its recommendations are expressed in sentences in which the principal auxiliary verb is “should”.

presented in smaller italic type, and does not constitute a normative element.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

In particular attention is drawn to the following statutory regulations:

The Health and Safety at Work etc. Act 1974 [1].

The Management of Health and Safety at Work Regulations 1999 [2].

The Control of Substances Hazardous to Health Regulations 2002 (as amended) [3].

Legionnaires' disease was first recognised in July 1976 and the bacterium later isolated and named *Legionella pneumophila*. Since then, over 50 other species of *Legionella* have been described of which at least 20 have been associated with disease in humans. These organisms are widespread in the natural aquatic environment and in artificial water systems. The organism is an opportunistic human pathogen and infection is more often associated with artificial water systems. The disease is not known to be transmissible via person-to-person contact. As a result, the way to prevent or control outbreaks of Legionnaires' disease is to inhibit or limit the growth of these organisms in water. In the UK, the control of legionellae (bacteria of the genus *Legionella*) falls within the general requirements of the Health and Safety at Work etc. Act [1] and the Control of Substances Hazardous to Health Regulations 2002 (as amended) [3].

Legionellae are only able to grow in water in the presence of other micro–organisms. In vitro they have been shown to be capable of growth within a number of protozoa, particularly amoebae and to be supported by some bacteria such as flavobacteria. In addition, legionellae have been shown to be associated with biofilm on surfaces in water systems where they can grow in the protozoa grazing the biofilm and there is also evidence suggesting they can grow outside protozoa alongside and supported by other organisms within the biofilm. Growth within protozoa, particularly with the potential for incorporation within protozoal cysts, can protect legionellae from biocides, heat and drying. This enables the legionellae to survive under conditions that would otherwise be fatal to them and to be transported within both protozoa and cysts to more favourable environments where they might subsequently grow. The association with biofilms, as with other aquatic bacteria, offers legionellae a nutritional advantage and also provides them with some protection against adverse environmental conditions, particularly biocides, that would otherwise kill them if they were simply suspended within the water column. Thus control of biofilm formation within water systems is of paramount importance for the control of legionellae.

The numbers of reports of Legionnaires' disease continues to rise, probably due to an increased recognition of the disease using improved diagnostic methods but possibly also resulting from a greater exposure to potential sources. To demonstrate that measures to control legionellae are effective there is an increasing need to sample potential sources for the presence of legionellae. Sampling is also required when investigating the sources of infection in cases of Legionnaires' disease. It is, therefore, the aim of this document to bring together information on likely sources of Legionnaires' disease, the selection of sampling sites and the methods of sampling for the purposes of routine monitoring, investigating a problem, or an outbreak investigation. Although it is necessary to cover some aspects of risk assessment in order to facilitate the selection of sampling sites, it is not the intention to give extensive explanations of how to carry out a risk assessment, as this is covered elsewhere, for example, in the Water Management Society guide [4].

To ensure personnel safety, a risk assessment of the system to be sampled should be conducted before sampling.

In the UK, outbreaks of Legionnaires' disease have been commonly associated with evaporative cooling towers and condensers, hot and

and spa pools. The use of nebulizers, or other medical respiratory equipment, contaminated with legionellae (usually by filling or washing such items with tap water containing the bacteria) has also been reported to cause infection. Other sources that have been implicated in outbreaks globally include cutting fluids (containing oil-in-water emulsions of about 95% water, and used for lubricating machine tools), natural warm spas or hot springs, indoor fountains, potting composts and ultrasonic misting devices used to humidify food display areas in shops and restaurants, pressure washers, air scrubbers and effluent treatment plants.

Household plumbing systems have also been implicated as sources of Legionnaires' disease. In one UK study [5], legionellae were isolated from approximately 15% of the homes of patients compared with approximately 5% of homes used for control purposes.

1 Scope

This British Standard gives recommendations and guidance on the sampling of water and related materials for determination of the presence of organisms of the genus *Legionella*. It is applicable to sampling artificial water systems and also gives methods for sampling of biofilms and sediments that might be present in water systems. Some of the same sampling principles can be applied to natural water systems.

The standard is applicable to both sampling for routine monitoring and in outbreak investigations. For the latter, recommendations and guidance on the selection of sampling points are given. The rationale for the selection of sampling points for particular situations is also discussed.

This British Standard is intended for use by all those involved in water sampling for legionellae including the persons taking samples on site and their employers.

2 Normative references

BS EN ISO 19458*, Water quality – Sampling for microbiological analysis*

3 Terms and definitions

For the purposes of this British Standard, the following terms and definitions apply.

3.1 aerosol
suspension in a gaseous medium of solid particles, liquid particles or solid and liquid particles having negligible falling velocity

3.2 artificial water system
water system that has been constructed and does not occur naturally, e.g. a hot water system

3.3 biocide
substance which kills micro-organisms

3.4 biofilm
community of bacteria and other micro-organisms, embedded in a protective layer with entrained debris, attached to a surface

3.5 blind-end
length of pipe closed at one end through which no water can pass

3.6 calorifier
apparatus used for the transfer of heat to water in a vessel by indirect means, the source of heat being contained within a pipe or coil immersed in the water

*NOTE 1 see also plate heat exchanger (**3.21**).*

NOTE 2 A 'storage calorifier' also stores some of the heated water in the same vessel.