BS 8580-1:2019

BSI Standards Publication

Water quality – Risk assessments for *Legionella* control – Code of practice

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Published by BSI Standards Limited 2019

ISBN 978 0 580 51636 8

ICS 07.100.20, 13.060.70

The following BSI references relate to the work on this document:
Committee reference EH/3/4
Draft for comment 18/30367523 DC

Amendments/corrigenda issued since publication

Date	Text affected

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Summary of pages
This document comprises a front cover, and inside front cover, pages i to ii, pages 1 to 48, an inside back cover and a back cover.

Foreword

Publishing information

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 31 January 2019. 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 these committees can be obtained on request to their secretary.

Supersession

This British Standard supersedes BS 8580:2010, which is withdrawn.

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.

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".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Where words have alternative spellings, the preferred spelling of the Shorter Oxford English Dictionary is used (e.g. "organization" rather than "organisation").

The word "should" is used to express recommendations of this standard. The word "may" is used in the text to express permissibility, e.g. as an alternative to the primary recommendation of the clause. The word "can" is used to express possibility, e.g. a consequence of an action or an event.

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.

Introduction

Legionellosis refers to illness caused by bacteria of the genus *Legionella* including Legionnaires' disease and Pontiac fever. The most serious form of disease caused by *Legionella* is Legionnaires' disease, a severe pneumonia with a relatively high fatality rate, which was first recognized in 1976. Outbreaks and sporadic infections occur throughout the world. At least 61 species of *Legionella* have been described and over 28 have been associated with disease in humans, but the predominant cause of Legionnaires' disease is *L. pneumophila. Legionella* are opportunistic pathogens of humans and normally inhabit warm, moist or aquatic environments where they grow in association with other organisms. In particular, they are known to grow in a range of protozoa. Their predilection for warm water means that they are capable of colonizing artificial water systems and equipment containing water. Legionnaires' disease is not contagious from person to person but is of environmental origin and usually contracted by inhaling the organism in an aerosol produced from water contaminated with the organism. Aspiration of water (water going down the wrong way) containing *Legionella* can also cause infection, particularly in hospitalized individuals.

There is a chain of events leading to an individual contracting Legionnaires' disease:

- the water system needs to become contaminated (inoculated) with the bacteria;
- hazardous conditions have to exist within the system for the amplification of the bacteria to sufficient concentrations to cause infection;
- the contaminated water usually needs to be dispersed into droplets fine enough to form an aerosol for transmission to the individual;
- inhalation of contaminated aerosols or, in rare cases, aspiration of contaminated drinking water; and
- the exposed individual has to be susceptible to succumb to infection.

The ubiquitous occurrence of *Legionella*, combined with their association with protozoa, means that all building water systems are susceptible to contamination with *Legionella* via the water supply or dust entering the system. It is therefore normal practice to assume that a system can become contaminated. Whether the amplification of *Legionella* is likely within the equipment or system can be inferred from the conditions of the water; the design, construction and operating conditions of the equipment or system at the time of assessment; and records of treatment and monitoring of the equipment or system in the past. It is not recommended to test for the presence of *Legionella* prior to the implementation of a water management programme.

The generation of aerosols can be observed in the operation of systems such as cooling towers, evaporative condensers, industrial processes, spa pools/hot tubs, showers and taps. Many of these can produce substantial aerosols. Some systems, such as cooling towers, evaporative condensers and some industrial processes, can transmit the aerosol widely, exposing a large population over an area up to several kilometres. Spa pools and hot tubs can expose many users and anyone in the immediate vicinity, while showers and taps are most likely to lead only to the exposure of individual users.

Finally, for an individual to become infected following exposure they have to be susceptible, usually having predisposing conditions. Only a very small proportion of those exposed develop disease, but increasing age, particularly 50 years and over, smoking, being male and being immunosuppressed through disease or treatment can increase susceptibility. Host susceptibility is therefore an important factor influencing risk and needs to be considered in the assessment.

A site-specific analysis of hazardous conditions allows appropriate control measures to be identified and put in place to protect the health and safety of employees and members of the public who could be affected by work activities. *Legionella* risk assessment is no different and is a legal requirement

under the Health and Safety at Work etc. Act 1974 [1]. The Management of Health and Safety at Work Regulations [2], [3] and the Control of Substances Hazardous to Health Regulations [4], [5] make specific requirements for risk assessment. These regulations apply to the control of *Legionella* and are embodied in the Approved Code of Practice and guidance document, "*Legionnaires' disease: The control of Legionella bacteria in water systems*" [6], otherwise known as ACoP L8, and the associated Technical Guidance HSG274 Parts 1 to 3 [7] and HSG282, *The control of legionella and other infectious agents in spa-pool systems* [8].

Risk assessment is an ongoing process and the report of the risk assessment's findings is a live document. The risk assessment report needs to be reviewed regularly in anticipation of, rather than in response to, changes. For example, the risk assessment for a new construction ought to be performed before commissioning, but then reviewed when the system has been operating normally for several weeks or months. It is recommended that a risk assessor is involved from the design stage onwards.

It is the responsibility of the duty holder to ensure that an assessment is carried out to identify and assess the risk of exposure to *Legionella* from work activities and water systems and to put in place any necessary precautions. The duty holder appoints a person to take day-to-day responsibility for controlling any identified risk from *Legionella*. The appointed competent person(s) (also known as responsible person) needs to have:

a) sufficient standing and authority within the organization (e.g. a manager or director) and competence and knowledge of the system to ensure that all operational procedures are carried out in a timely and effective manner; and

b) a clear understanding of their duties and the overall health and safety management structure and policy in the organization.

If the duty holder is competent, they may appoint themselves as the competent person. Further guidance for duty holders on how to put in place suitable arrangements for managing health and safety risk is provided in HSG65: *Managing for Health and Safety* [9].

A person is identified to carry out the risk assessment. This person can be an employee of the duty holder or an external contractor. This British Standard gives recommendations for how such a person conducts a risk assessment for *Legionella*, though the duty holder remains accountable for implementing the recommendations.

1 Scope

This British Standard gives recommendations and guidance on *Legionella* risk assessment relevant to water systems. It is applicable to any undertaking involving a work activity or premises controlled in connection with a trade, business or other undertaking where there is potential for exposure to water or when water is used or stored in circumstances that could cause a reasonably foreseeable risk of infection by *Legionella* and contracting legionellosis.

This British Standard is applicable to risk assessments being undertaken on premises, plant and systems for the first time. It also covers reviews and reassessments where a previous assessment has been undertaken and where control measures might have been implemented.

While the principles of risk assessment presented in this British Standard can be applied to natural waters, including rivers, lakes, ponds, waterfalls, caves, dew ponds or natural recreational facilities, such as boating lakes, this British Standard does not give specific recommendations for these water sources. This British Standard does not give recommendations for the preparation of the scheme of control for the risk systems identified.

Annex A gives general guidance on the assessment of systems, while Annex B to Annex E give guidance on the assessment of specific types of system. A list of equipment that might be used by a risk assessor is given in Annex F, and Annex G gives guidance on the production of schematic diagrams.

NOTE The guidance in the annexes is not intended to be exhaustive but merely to highlight some of the more common issues associated with particular systems to be considered as part of a Legionella risk assessment. Where appropriate, these annexes contain references to publications that give more detailed information about these systems.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes provisions of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 7592, *Sampling for Legionella bacteria in water systems — Code of practice*

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

NOTE In the context of this document, it is a suspension of particles which might contain Legionella with a typical droplet diameter size of <5 µm that can be inhaled deep into the lungs.

3.2 aspiration

liquid accidentally passing into the lungs when swallowing

NOTE This is commonly referred to as water "going down the wrong way".

3.3 asset register

list of all items relevant to the risk and control of legionellosis and pertinent information to allow them to be effectively used in the written scheme of control and in the risk assessment

NOTE Ideally, this will be made available to the risk assessor by the duty holder. This includes the physical components of the system and might also include other standalone items that could present a legionellosis risk. It also includes the schematic diagram, scheme of control and risk assessment.

3.4 biofilm

community of bacteria and other microorganisms and entrained debris, embedded in a protective layer at interfaces in water systems

3.5 calorifier

apparatus used for the transfer of heat to water in a vessel by indirect means and incorporating a source of heat

