

PD 855468:2015



BSI Standards Publication

PUBLISHED DOCUMENT

Guide to the flushing and disinfection of services supplying water for domestic use within buildings and their curtilages

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Published by BSI Standards Limited 2015

ISBN 978 0 580 88692 8

ICS 91.140.60

The following BSI references relate to the work on this document:
Committee reference EH/3

Publication history

First published September 2015

Amendments issued since publication

Date	Text affected
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Foreword

Publishing information

This Published Document is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 30 September 2015. It was prepared by Technical Committee EH/3, *Water quality*. A list of organizations represented on this committee can be obtained on request to its secretary.

Information about this document

This Published Document has been developed to build on the guidance previously given in BS 8558 on the flushing and disinfection of services supplying water for domestic use within buildings and their curtilages, which was regarded as beyond the scope of that British Standard. The intention is to eventually develop this as a British Standard.

A review of this Published Document will be carried out not later than five years after its publication. Informative annexes about the pH impact of various chlorine doses are planned for inclusion in a future revision of this Published Document or when it is converted to a British Standard. Testing is currently being undertaken by Scottish Water.

Any observations or comments will be welcomed. These should be sent to the Secretary of BSI Technical Committee EH/3 at BSI Head Office, at the address on the back cover. On the basis of the replies received, the responsible BSI Committee will judge whether the Published Document can be converted to a British Standard.

Test laboratory accreditation. Users of this British Standard are advised to consider the desirability of selecting test laboratories that are accredited to BS EN ISO/IEC 17025 by a national or international accreditation body.

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Use of this document

As a guide, this Published Document takes the form of guidance and recommendations. It should not be quoted as if it were a specification or a code of practice and claims of compliance cannot be made to it.

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 guidance in this standard is presented in roman (i.e. upright) type. Any 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.

Contractual and legal considerations

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

Compliance with a Published Document cannot confer immunity from legal obligations.

Attention is drawn to the following statutory regulations.

- Health and Safety at Work etc. Act 1974 [1];
- Control of Substances Hazardous to Health (COSHH) Regulations 2002 [2];
- REACH Regulation [3];
- **The Water Fittings Regulations:**
 - The Water Supply (Water Fittings) Regulations 1999, as amended, in England and Wales [4];
 - The Water Supply (Water Fittings) (Scotland) Byelaws 2014, in Scotland [5];
 - The Water Supply (Water Fittings) Regulations (Northern Ireland) 2009, in Northern Ireland [6];

NOTE 1 These Regulations apply to requirements relating to plumbing systems in premises to which a supply of public water (municipal water supply) has been provided.

- **The Water Quality Regulations:**
 - The Water Supply (Water Quality) Regulations 2000, as amended, in England [7];
 - The Water Supply (Water Quality) Regulations 2010, in Wales [8];
 - The Public Water Supplies (Scotland) Regulations 2014, in Scotland [9];
 - The Water Supply (Water Quality) Regulations (Northern Ireland) 2007, as amended, in Northern Ireland [10];

NOTE 2 These Regulations apply standards of wholesomeness to water provided from the public supply (municipal supply).

- **The Private Water Supplies Regulations:**
 - The Private Water Supplies Regulations 2009, as amended, in England [11];
 - The Private Water Supplies (Wales) Regulations 2010, as amended, in Wales [12];
 - The Private Water Supplies (Scotland) Regulations 2006, as amended, in Scotland [13];
 - The Private Water Supplies Regulations (Northern Ireland) 2009, as amended, in Northern Ireland [14];

NOTE 3 These Regulations apply standards of wholesomeness to water provided from private water sources (non-municipal supply).

- **The Water Industry Acts:**
 - Water Industry Act 1991, as amended, in England and Wales [15];
 - Water (Scotland) Act 1980, as amended, in Scotland [16];
 - The Water and Sewerage Services (Northern Ireland) Order 2006, as amended, in Northern Ireland [17].

1 Scope

This Published Document provides guidance on cleaning, flushing and disinfection of services supplying water for domestic purposes within buildings and their curtilages, including those for the production of foods, but excluding closed systems or other industrial processes.

NOTE 1 See the Water Quality Regulations [7], [8], [9] and [10] and BSRIA Guide 29-2012 [18] for cleaning closed systems. "Domestic purposes" refers to water used for drinking, washing, cooking and sanitation.

The guidance is intended to help prepare new and existing systems for use and control microbiological growth in water systems for supply, storage and distribution, to ensure that:

- a) residues of construction are adequately flushed from water distribution systems;
- b) appropriate water quality is achieved;
- c) appropriate disinfectants and processes are used;
- d) construction debris and dust are removed;
- e) risk of corrosion and damage to fixtures, fittings and sensitive plant is minimized;
- f) adequate records of cleaning are produced;
- g) stagnation is avoided or managed; and
- h) appropriate tools and personnel are deployed for the relevant tasks.

The guidance applies to:

- 1) initial commissioning of new or extended systems;
- 2) maintenance of existing systems;
- 3) alteration of existing systems;
- 4) water quality management prior to occupation or as a result of low/no occupancy or usage; and
- 5) (remedial) response to microbiological problems is identified.

NOTE 2 The techniques set out in this standard are also applicable to the management of premises and systems where water is provided from a private supply.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Standards publications

BS 1427, *Guide to on-site test methods for the analysis of waters*

BS 8550, *Guide for the auditing of water quality sampling*

BS 8551, *Provision and management of temporary water supplies and distribution networks (not including provisions for statutory emergencies) – Code of practice*

BS 8554:2015, *Code of practice for the sampling and monitoring of hot and cold water services in buildings*

BS 8558:2015, *Guide to the design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages – Complementary guidance to BS EN 806*

BS EN 806-4, *Specifications for installations inside buildings conveying water for human consumption – Part 4: Installation*

BS EN 901, *Chemicals used for treatment of water intended for human consumption – Sodium hypochlorite*

BS EN ISO 5667-1, *Water quality – Sampling – Part 1: Guidance on the design of sampling programmes and sampling techniques*

BS ISO 5667-21, *Water quality – Sampling – Part 21: Guidance on sampling of drinking water distributed by tankers or means other than distribution pipes*

Other publications

[N1]UK WATER. Principles of Water Supply Hygiene ¹⁾

[N2]FOOD STANDARDS AGENCY. *Food Handlers: Fitness to Work. Regulatory Guidance and Best Practice Advice for Food Business Operators*. Food Standards Agency. 2009. ²⁾

3 Terms and definitions

For the purposes of this Published Document, the following terms and definitions apply.

3.1 cistern

fixed, vented container for holding water at atmospheric pressure

[SOURCE: BS 8558:2015, 3.1.5]

NOTE A cistern is commonly referred to as a “cold water tank”.

3.2 chain of custody

process that ensures the integrity of a sample is maintained and traced from the point of sample collection until the sample reaches the laboratory, so that the sample is accounted for at all times

NOTE A chain-of-custody document accompanies the sample from the time of collection till delivery to the laboratory.

3.3 cleansing flushing

use of water for the removal of:

- a) any debris and organic matter that encourage the growth of biofilms and subsequent deterioration of water quality;
- b) any excess of flux which can cause corrosion of copper pipes if left in place under conditions of low or no flow; or
- c) the residues of all disinfection

NOTE Residues might include materials which could give rise to unacceptable concentrations of endotoxins and/or pyrogens (e.g. for water for haemodialysis, see BS ISO 13959).

¹⁾ Available at:
<http://www.water.org.uk/publications/reports/principles-water-supply-hygiene> [viewed: 16 September 2015].

²⁾ Available at:
<http://www.food.gov.uk/sites/default/files/multimedia/pdfs/publication/foodhandlersireland1009.pdf> [viewed: 16 September 2015].

3.4 commissioning

process of bringing a new water system into operation

3.5 CT value

product of the concentration of a disinfectant (e.g. free chlorine) and the contact time with the water being disinfected

NOTE Typically expressed in units of mg-min/L.

3.6 disinfection

process which removes or renders inactive pathogenic microorganisms or parasites

3.7 distribution network

core infrastructure providing water in an area to individual premises or for individual premises to be connected to

3.8 hygiene flushing

drawing off water for the avoidance of stagnation

3.9 physical cleaning

manual removal of physical contaminants or debris, e.g. cleaning of cistern covers

3.10 stagnation

situation where there is no or little flow and in which adverse quality changes can take place over a period of time

3.11 tank

closed vessel holding water at greater than atmospheric pressure

[SOURCE: BS 8558:2015, 3.1.38]

NOTE This term is often used to describe, incorrectly, a cold water cistern.

3.12 wholesome water

water that is of an acceptable biological, chemical and physical quality for drinking, cooking, food preparation or washing without any potential danger to human health

NOTE National requirements are set out in the Water Quality Regulations [7], [8], [9] and [10] or the Private Water Supplies Regulations [11], [12], [13] and [14], according to how the premises are supplied. These stipulate the criteria that the water needs to meet to protect human health and ensure user acceptability. The parameters include limits on:

- *biological quality, including levels of bacteria and oocysts;*
- *chemical quality, including levels of metals, solvents, pesticides and hydrocarbons; and*
- *physical qualities, including turbidity, colour, taste and odour.*

4 Operational plan

4.1 Only appropriately competent people should work on water systems. Evidence of the competence of individuals undertaking the work should be confirmed, indicating that the knowledge and experience of the operatives is satisfactory for undertaking the proposed work.

4.2 Personnel working on water systems should follow the Water UK *Principles of Water Supply Hygiene* [N1] or the *Food Handlers: Fitness to Work* Guidance [N2] regarding medical screening and suitability to work on water systems, e.g. exclusion from the workplace.

NOTE The Energy & Utility Skills Register (EUSR) administers The National Water Hygiene Card ³⁾ on behalf of water suppliers using the Principles of Water Supply Hygiene. The WaterSafe Installers Scheme ⁴⁾ operates a register of installers approved under The Water Fittings Regulations [4], [5] and [6] (referred to as “approved contractors” or “approved plumbers”).

4.3 The operational plan should take into account water hygiene considerations. For example, no water system should be filled until the drainage is connected because regular flushing would be impossible.

4.4 Where working on wholesome water systems, dedicated tools and equipment should be used and these should be segregated from tools used for other applications, such as working on drains, macerators or foul pumping systems.

4.5 A risk assessment should be carried out and a safe system of work put in place throughout the cleaning, disinfection, flushing and sampling processes.

4.6 A suitable safe system of work or, for a more complex system, a site-specific method statement should be obtained/prepared before the start of any cleaning and/or disinfection of a water system. The documentation should clearly define the process to be undertaken and should be derived from risk assessments of the hazards typically encountered, which might include:

- a) bacteria;
- b) access/egress, storage and special site hazards, e.g. asbestos;
- c) machinery and equipment isolation;
- d) work in confined spaces;
- e) manual handling;
- f) work at height;
- g) slips, trips and falls;
- h) electrical equipment;
- i) chemical(s) to be used;
- j) need for personal protective equipment;
- k) a cistern hatch not being sealed and locked after disinfection; or
- l) waste disposal and chemical neutralizing process (a discharge permit might be required from the water utility).

³⁾ <https://www.eusr.co.uk/eusr/the-eusr-card/the-national-water-hygiene-card> [viewed: 16 September 2015].

⁴⁾ <https://www.watersafe.org.uk/> [viewed: 16 September 2015].

4.7 The concentration of disinfectant to be used should be predefined based on the materials, manufacturers' instructions, operation conditions and end use.

NOTE The client ought to have determined if cisterns storing water for domestic purposes are made from, or lined with, material that is verified as suitable for contact with drinking water, such as those listed by WRAS in the Water Fittings and Materials Directory [19] or with supporting documentation demonstrating conformity to BS 6920-1 and the appropriate corresponding components.

4.8 If neutralizing agents are used, a process should be implemented to ensure that the water storage cistern is not overdosed and that no residual neutralizing agent is left in the water storage cistern or associated system on completion of the disinfection.

4.9 To ensure that only those parts of the system that are to be disinfected are treated, as-fitted or schematic diagrams of the water system should be consulted.

4.10 Only biocides and materials appearing in the *List of Approved Products for use in Public Water Supply in the United Kingdom* published by the Drinking Water Inspectorate (DWI) [20] should be used in contact with water.

NOTE The only controlled version of this document can be accessed on the DWI Website.⁵⁾ Printed copies of this document, together with electronic copies held on local computers and other storage devices, are uncontrolled. A similar list is published by the Scottish Government⁶⁾ and the Department for Regional Development in Northern Ireland will eventually publish a list. A treatment system utilizing biocidal copper can only be selected if it is authorized under the appropriate product type within the EU Biocidal Products Regulation [21] and the REACH Regulation [3]. Further advice on appropriate systems can be found on the HSE website.⁷⁾ The supplier of the disinfectant is required to be registered under the Biocidal Products Regulations [21].

5 Commissioning or decommissioning

5.1 General

5.1.1 The initial commissioning of a new hot or cold water system is critical to its performance throughout the building's life. In a simpler system (e.g. tenanted housing, individually occupied dwelling or a small office) this could involve simply opening the incoming stopcock, purging air from the system and carrying out a cleansing flush. A larger system requires more complex commissioning procedures, including disinfection, and careful risk assessment and management to avoid bacterial colonization at this initial stage.

5.1.2 Prior to connection to the permanent supply the incoming supply pipe should be pressure-tested, flushed and, if necessary, disinfected.

NOTE Where required by the local water supplier or the contract, or deemed necessary by the service provider, the efficacy of disinfection might need to be demonstrated by microbiological tests, such as those described in 10.2.

5.1.3 Guidance should also be sought from the local water supplier as to any particular requirements that might apply.

⁵⁾ <http://www.dwi.gov.uk/drinking-water-products/approved-products/soslistcurrent.pdf> [viewed: 16 September 2015].

⁶⁾ <http://www.gov.scot/Publications/> [viewed: 16 September 2015].

⁷⁾ <http://www.hse.gov.uk/> [viewed: 16 September 2015].