

SINGAPORE STANDARD

**Suitability of non-metallic products for
use in contact with water intended for
human consumption with regard to their
effect on the quality of the water**

– Part 2:4: Methods of test – Growth of aquatic
microorganisms test

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– Part 2:4: Methods of test – Growth of aquatic microorganisms test

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PUB, the National Water Agency

Setsco Services Pte Ltd

Singapore Sanitary Ware Importer and Exporter Association

Singapore Water Association

Standard Chemical Corporation Pte Ltd

TUV SUD PSB Pte Ltd

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National Foreword

This Singapore Standard was prepared by the Working Group on Drinking Water appointed by the Technical Committee on Water under the direction of the Chemical Standards Committee.

This is a revision of SS 375 : Part 2:4 : 2001. It is an identical adoption of BS 6920-2.4 : 2000 + A1: 2014 'Suitability of non-metallic products for use in contact with water intended for human consumption with regard to their effect on the quality of the water – Part 2: Methods of test – Section 2.4: Growth of aquatic microorganisms test', and is implemented with the permission of BSI Standards Limited.

The following editorial changes were made:

<u>Clauses/Subclauses</u>	<u>Modification</u>
Clause 1 – NOTE; Bibliography – Other publications	<i>Deleted the reference to UK regulations [3] to [9] Explanation: These regulations are not applicable to Singapore.</i>

Where appropriate, the words 'British Standard' have been replaced by 'Singapore Standard'. The references to the BS 6920 series have been replaced by the following Singapore Standards:

BS 6920 Series	Corresponding Singapore Standard
BS 6920	SS 375
BS 6920-1: 2014	SS 375: Part 1: 2015
BS 6920-2	SS 375: Part 2
BS 6920-2.1: 2014 + A3: 2014	SS 375: Part 2:1: 2015
BS 6920-2.2.1: 2000 + A3: 2014	SS 375: Part 2:2:1: 2015
BS 6920-2.4	SS 375: Part 2:4

Attention is drawn to the possibility that some of the elements of this Singapore Standard may be the subject of patent rights. Enterprise Singapore shall not be held responsible for identifying any or all of such patent rights.

NOTE

1. *Singapore Standards (SSs) and Technical References (TRs) are reviewed periodically to keep abreast of technical changes, technological developments and industry practices. The changes are documented through the issue of either amendments or revisions.*
2. *An SS or TR is voluntary in nature except when it is made mandatory by a regulatory authority. It can also be cited in contracts making its application a business necessity. Users are advised to assess and determine whether the SS or TR is suitable for their intended use or purpose. If required, they should refer to the relevant professionals or experts for advice on the use of the document. Enterprise Singapore shall not be liable for any damages whether directly or indirectly suffered by anyone or any organisation as a result of the use of any SS or TR.*
3. *Compliance with a SS or TR does not exempt users from any legal obligations.*

Foreword

Publishing information

This subsection of BS 6920 is published by BSI Standards Limited, under license from The British Standards Institution and came into effect on 15 May 2000. It was prepared by EH/3/7, *Effects of materials on water quality*. Amendment No. 1 was prepared by Technical Committee EH/6, *Effects of materials on water quality*.

Supersession

BS 6920-2.4:2000 + A1:2014 supersedes BS 6920-2.4:2000, which is withdrawn.

Relationship with other publications

BS 6920 is published in several parts, namely *Part 1: Specification*, *Part 2: Methods of test*, *Part 3: High temperature tests* and *Part 4: Method for the GCMS identification of water leachable organic substances*.

Part 2 is further subdivided into a number of sections and subsections as follows.

Section 2.1: Samples for testing;

Section 2.2: Odour and flavor of water;

Subsection 2.2.1: General method of test;

Subsection 2.2.2: Method of testing odours and flavours imparted to water by multi-layered hoses and pipes;

Subsection 2.2.3: Method of testing odours and flavours imparted to water by hoses for conveying water for food and drink preparation;

Section 2.3: Appearance of water;

Section 2.4: Growth of aquatic microorganisms test;

Section 2.5: The extraction of substances that may be of concern to public health;

Section 2.6: The extraction of metals.

Information about this document

This edition introduces technical changes but it does not reflect a full review or revision of the standard.

Hazard warnings

WARNING. This British Standard calls for the use of live microorganisms, substances and/or procedures that can be injurious to health if adequate precautions are not taken. Tests should only be carried out in laboratories with suitable facilities and by suitably qualified persons with an appropriate level of chemical and microbiological expertise. Standard microbiological procedures and precautions should be followed throughout, taking into account that test extracts could contain potentially pathogenic microorganisms. This British Standard refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage.

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

Organic substances present in non-metallic materials (either as ingredients, contaminants or process by-products) which are capable of being utilized by microorganisms can give rise to a noticeable deterioration in the quality of the water with which they are in contact. This deterioration may manifest itself as a change in either the organoleptic, physical or microbiological characteristics of the water. Microbial growth may occur in the water itself or at the material/water interface. The phenomenon is distinct from that of microbial attachment which can occur on the surface of any material type. If utilizable substances leach out of the material into the water, then the growth will be self-limiting and decline in proportion to the rate of leaching. In practical situations, growths on such materials have been found to persist for periods from 18 months to 3 years. Where the utilizable substance is bound within or to the material, then growths have been found to persist indefinitely.

Materials capable of supporting microbial growth are unlikely to give rise to an observable deterioration in water quality in every situation. This is due to the influence of various environmental factors, particularly temperature and the presence of residual chlorine. However, in plumbing systems the water temperature is rarely low enough to inhibit microbial growth and the low residual chlorine concentration present in public water supplies will not exert any appreciable bactericidal or bacteriostatic action once the water is within the customer's pipework.

Water intended for human consumption has been treated to ensure the absence of microbial pathogens but it is not sterile. The numbers and types of harmless microorganisms present in water intended for human consumption vary considerably and the natural flora comprises many strains that are adapted to living in a relatively hostile environment. Such organisms differ in their physiological capacity from strains of the same organisms found in other environments or grown in the laboratory. Tests using natural strains of aquatic organisms have given responses that correlate well with the occurrence of problems in practice, whereas the responses of laboratory cultures have not given reliable predictions of the performance of a material in practice.

No single technique, based on growing microorganisms on or in culture media, exists to enumerate all the aquatic microorganisms present in a sample of water. Thus, overall numbers of microorganisms can only be assessed by an indirect measurement of their activity. The method of assessing microbial activity in the test system described in this section of SS 375 is the measurement of dissolved oxygen uptake. All the organisms which give rise to appreciable microbial growth respire aerobically and exert an influence on the concentration of oxygen dissolved in the water in the test systems. Other indirect measurement techniques are currently being developed.

A variety of factors may influence the capacity of living organisms to respond in a predictable manner and thus validation procedures are an essential part of any biological assay. A validation procedure fulfils a similar role to a calibration procedure in a physico-chemical test method. The validation procedure in this method is designed to identify the use of unsuitable test reagents or an error in the undertaking of the assay or "chance" occurrences. (These may occur at random when large numbers of assays using living organisms are performed over an extended time period). Validation is achieved through the use of reference materials.

Suitability of non-metallic products for use in contact with water intended for human consumption with regard to their effect on the quality of the water – Part 2:4: Methods of test – Growth of aquatic microorganisms test

1 Scope

This section of SS 375 specifies a method for assessing the ability of a product to promote the multiplication of aerobic aquatic microorganisms in water intended for human consumption. The method is applicable to all types of non-metallic product used in contact with water intended for human consumption.

NOTE The National Regulator may specify additional provisions in some cases and will assess the significance of the results obtained.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of SS 375. For dated references, subsequent amendments to or revisions of any of these publications do not apply. For undated references, the latest edition of the publication referred to applies.

SS 375 : Part 1 : 2015, *Suitability of non-metallic products for use in contact with water intended for human consumption with regard to their effect on the quality of the water – Part 1 : Specification.*

SS 375 : Part 2:2:1 : 2015 *Suitability of non-metallic products for use in contact with water intended for human consumption with regard to their effect on the quality of the water - Part 2:2:1: Methods of test – Odour and flavour of water – General method of test.*

BS EN 25814, *Method for determination of dissolved oxygen in water: electrochemical probe method.*

BS EN ISO 3696, *Water for analytical laboratory use – Specification and test methods.*