

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 2.3: Appearance of water

ICS 13.060.20

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by Technical Committee EH/3, Water quality, to Subcommittee EH/3/7, *Effects of materials on water quality*, upon which the following bodies were represented:

- Association of Manufacturers of Domestic Electrical Appliances
- Automatic Vending Association of Britain
- British Bathroom Council
- British Cement Association
- British Coatings Federation Ltd.
- British Malleable Tube Fittings Association
- British Non-Ferrous Metals Federation
- British Plastics Federation
- British Plumbing Fittings Manufacturers' Association
- British Precast Concrete Federation Ltd.
- British Rubber Manufacturers' Association
- British Valve and Actuator Manufacturers' Association
- British Water
- Department of the Environment for Northern Ireland
- The Drinking Water Inspectorate
- Galvanizers Association
- Laboratory of the Government Chemist
- Lead Development Association
- Pipeline Industries Guild
- UK Steel Association
- UK Water Byelaws Scheme
- Water Research Centre
- Water UK
- Zinc Development Association

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Foreword

Publishing information

This subsection of BS 6920 is published by BSI Standards Limited, under licence from The British Standards Institution and came into effect on 15 May 2000. It was prepared by Subcommittee 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BS 6920-2.3:2000+A1:2014 supersedes BS 6920-2.3:2000, which is withdrawn.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 flavour 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.

The start and finish of text introduced or altered by Amendment No. 1 is indicated in the text by tags **A1** **A1**. Minor editorial changes are not tagged.

Hazard warnings

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 4, an inside back cover and a back cover.

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1 Scope

This section of BS 6920 describes a method designed to assess the ability of a product to impart any noticeable colour or turbidity to 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 A1 Under the relevant National Regulations [1] to [7], the National Regulator may specify additional provisions in some cases and will assess the significance of the results obtained. A1

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this section of BS 6920. 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.

BS 6920-2.1:2014, *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 2.1: Samples for testing*.

BS EN ISO 3696:1995, *Water for analytical laboratory use — Specification and test methods*.

A1 BS EN ISO 7027:2000, *Water quality — Determination of turbidity*. A1

A1 BS EN ISO 7887:2011, *Water quality — Examination and determination of colour*. A1

3 Terms and definitions

For the purposes of this section of BS 6920, the following definitions apply.

3.1

standard unit (of colour) (in mg/l Pt)

the colour produced by a solution containing 1 mg of platinum per litre [in the form of hydrogen hexachloroplatinate(IV)], in the presence of 2 mg of cobalt (II) chloride hexahydrate per litre

NOTE The scale derived from this standard unit is sometimes called the "Hazen scale" or the "Pt/Co scale".

3.2

turbidity

reduction of transparency of a liquid caused by the presence of undissolved matter

NOTE This definition is taken from A1 BS EN ISO 7027:2000, *Water quality — Determination of turbidity*. A1

4 Principle

The sample of the product is immersed in water for 24 h and the colour and turbidity of the water are then measured. If any noticeable colour or turbidity is observed in the water, the same sample is immersed in test water for a further six sequential extraction periods, including one 72 h period and concluding with a 24 h period, using fresh test water for each period. The water from the final immersion period is measured and if any noticeable colour or turbidity is observed in the water then a further two samples are subjected to the same procedure.

NOTE Flow diagram showing the sequence of the test procedures is given in Annex A.

5 Reagents

5.1 Test water, distilled or deionized water conforming to grade 3 of BS EN ISO 3696. The following shall also apply.

- The colour of the water shall be less than 5 standard units (of colour) mg/l Pt when determined in accordance with A1 BS EN ISO 7887:2011, Clause 7 A1 .
- The turbidity of the water shall be less than 1 formazine nephelometric unit (FNU) when determined in accordance with A1 BS EN ISO 7027:2000, Clause 6 A1 .

5.2 Colour matching solutions, prepared following the instructions given in A1 BS EN ISO 7887 A1 .

5.3 Formazine solutions, prepared following the instructions given in A1 BS EN ISO 7027 A1 .

6 Apparatus

6.1 Laboratory ware, cleaned thoroughly using an aqueous solution of a biodegradable laboratory detergent followed by thorough rinsing with test water (5.1).

6.2 Test containers, consisting of borosilicate glass beakers calibrated for a capacity as given in BS 6920-2.1:2014, 5.1.2.

6.3 Colour measurement apparatus, as specified in A1 BS EN ISO 7887:2011, 7.4 A1 .

6.4 Incubator, capable of maintaining a temperature of $(23 \pm 1)^\circ\text{C}$.

6.5 Turbidity measurement apparatus, consisting of a nephelometer with measuring cells of glass and with a tungsten lamp, operated at between 85 % and 100 % of its rated voltage, as the light source.

The total distance travelled by the incident plus scattered light within the water sample shall not exceed 100 mm. The angle of light acceptance by the detector of the nephelometer shall not exceed 30° and it shall be centred at right angles to the incident light path.

7 Samples

7.1 General

Except as given in 7.2 and 7.3, samples shall conform to all the pertinent requirements given in BS 6920-2.1.

7.2 Reference materials

These are not required.

7.3 Cementitious materials

Since the test water used in this method has an aggressivity index of less than 12, precondition all samples made from cementitious materials in accordance with BS 6920-2.1:2014, 6.14.

8 Test procedure

8.1 Extraction procedure

The extractions periods shall be consecutive and without a break; if a break in the sequence does occur repeat the sequence using fresh samples.

8.1.1 Sample preparation

On the same day as testing is to start, rinse the sample in the test water (5.1) for 10 min.

8.1.2 First extract

Place each sample in a separate clean container (6.2). In addition, with each batch of test samples, include one empty container as a blank test. Add to the container sufficient test water (5.1) to reach the calibration mark given in BS 6920-2.1:2014, 5.1.2. Seal each container with a fresh piece of aluminium foil. If the density of the sample is less than that of water, ensure the sample is kept totally submerged in the test water for the duration of the test by using glass-encapsulated weights.

Store the containers at $(23 \pm 2)^\circ\text{C}$ for (24 ± 1) h in an incubator (6.4).

Then remove portions of water from each container and measure their colour and turbidity in accordance with 8.2.

8.1.3 Further extracts

If the first extract (8.1.2) shows either an increase in colour of greater than 5 standard units (of colour) mg/l Pt or an increase in its turbidity of greater than 0.5 FNU, drain the test water from each test container, including the blank, and refill to the same calibration mark with fresh test water and repeat the extraction for a further 24 h immersion period. Repeat the extraction for a further six sequential periods, including one 72 h period and concluding with a 24 h period, using fresh test water for each period.

Measure the colour and turbidity of portions of water withdrawn from the final extracts.

If the final extract shows either an increase in colour of greater than 5 standard units (of colour) mg/l Pt or an increase in its turbidity of greater than 0.5 FNU, repeat the procedure described in 8.1.1, 8.1.2 and 8.1.3 using two further untested samples.

8.2 Measurement of colour and turbidity

Measure the colour of each extract using the method described in [A] BS EN ISO 7887:2011, Clause 7. [A]. Measure the turbidity of each extract using the method described in [A] BS EN ISO 7027:2000, Clause 6 [A]. Report the results in accordance with Clause 9.

NOTE 1 For the measurement of colour, the method described in [A] BS EN ISO 7887:2011, Clause 7 [A] is used in preference to that specified in [A] BS EN ISO 7887:2011, Clause 5 [A], since some materials impart to water colours which show absorption at wavelengths other than 436 nm.

If an increase in turbidity occurs between the first extract (8.1.2) and the final extracts (8.1.3), then this is possibly due to microbial growth. Confirm this effect by carrying out a microscopic examination for organisms on the surfaces of the samples. However, if the product has been examined by the method described in BS 6920-2.4 and the result did not conform to BS 6920-1:2014, Clause 6, then this suffices for confirmation that the increase in turbidity is due to microbial growth.

NOTE 2 Do not report these turbidity results as they are due to microbial growth.

Repeat the test using fresh samples, sterile containers and sterile test water. Prewash the samples in sterile test water before starting the test.

9 Expression of results

Subtract the value obtained for the blank from each value obtained from a test container. If three samples of the same product have been tested, calculate the arithmetic mean of the values obtained from each of these three test containers. Subtract the value obtained for the blank from the arithmetic mean. Express the resultant values for colour as described in [A] BS EN ISO 7887:2011, 7.7 [A], and for turbidity as described in [A] BS EN ISO 7027:2000, 6.3.4 [A].

10 Test report

10.1 General

The test report shall include the following particulars:

- a title (e.g. "Test Report") and the date of issue of the report;
- a reference to this British Standard, i.e. BS 6920-2.3;
- name and address of laboratory, and location where the tests were carried out if different from the address of the laboratory;
- unique identification of the test report (such as serial number), and on each page an identification in order to ensure that the page is recognized as a part of the test report, and a clear identification of the end of the test report;

- name and address of the client placing the order;
 - description and unambiguous identification of the item(s) tested ± this shall meet the minimum requirements set out in BS 6920-2.1:2014, Clause 9;
 - reference to any sampling or sample preparation procedures used by the laboratory, or other bodies and where appropriate, chain of custody details where these are relevant;
- NOTE In the case of site applied products include all the requirements in accordance with BS 6920-2.1:2014, 9.5.
- date of receipt of test item(s) and date(s) of performance of the tests undertaken;
 - deviations from, additions to or exclusions from the test method;
 - the test results, expressed in accordance with Clause 9 (including units of measurement), from the first extract and, if undertaken, from the final extracts;
 - a statement of conformity/nonconformity with the test requirements of BS 6920-1:2014, Clause 5;
 - the name(s), function(s) and signature(s) or equivalent identification of person(s) authorizing the test report;
 - a statement to the effect that the results relate only to the items tested, and that the test report shall not be reproduced except in full, without written approval of the laboratory.

When the test report contains results of tests performed by subcontractors, these shall be clearly identified.

When reports are reissued to take into account errors/omissions, results of additional tests or for another reason one of two approaches shall be adopted:

- a) issue an additional test report containing the additional information or corrections only and clearly marked “Supplement to Test Report, Reference.....”;
- b) issue a complete amended report (usually the preferred option) with a statement added below the original date of issue of the report stating: “Reissued with correction/additional data/etc (as appropriate):(date)”.

NOTE Include all previous results for the tested item(s) in any reissued reports containing the results of additional tests.

When it is necessary to issue a completely new test report, it shall be uniquely identified and shall include a reference to the original that it replaces.

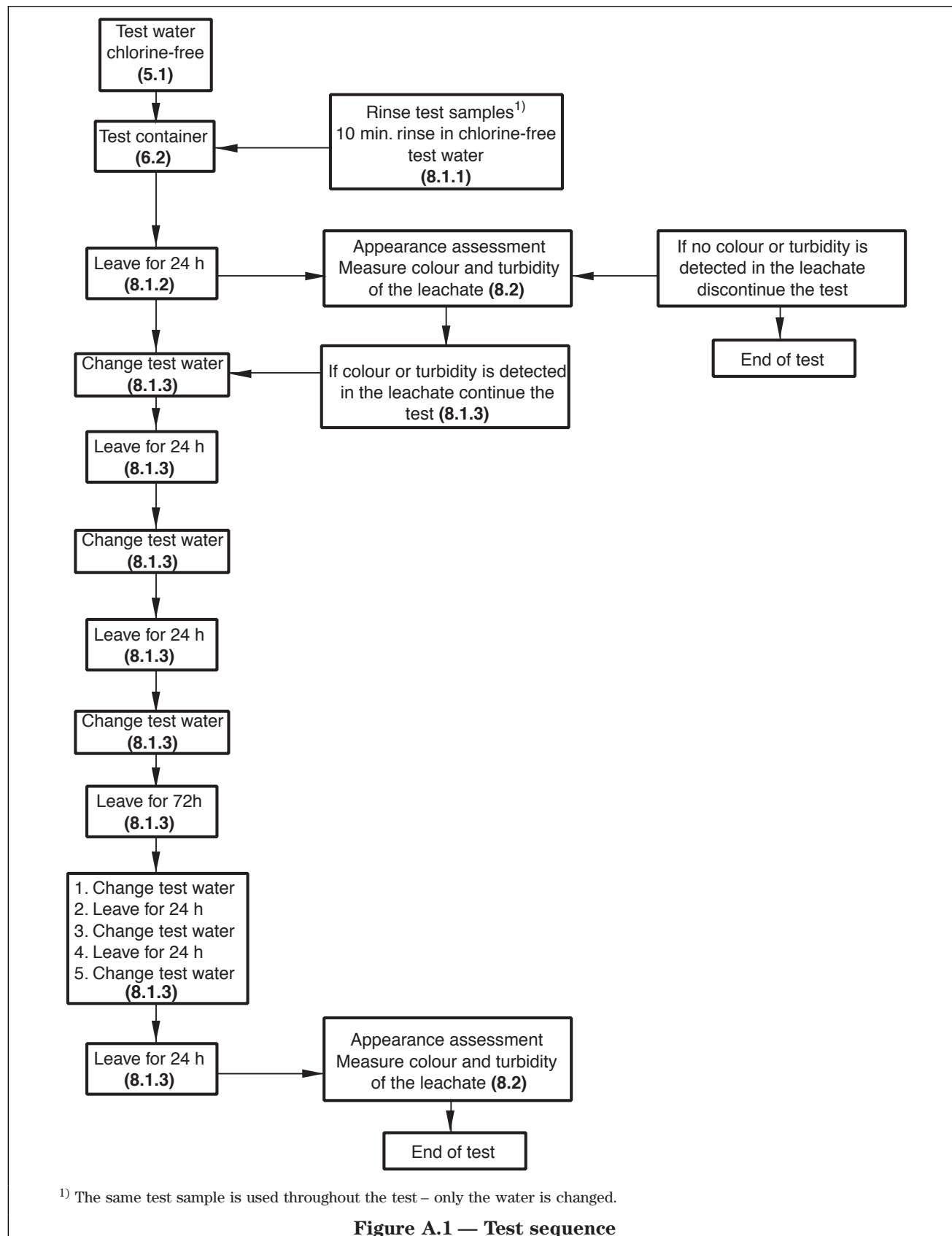
In reports based upon only some of the sections of BS 6920 the statement “NO OTHER TESTS WERE UNDERTAKEN ON THIS PRODUCT” shall be included.

10.2 Retesting using cold water test conditions/failure in BS 6920-3

If a product fails to conform with the high temperature tests and a cold water test is then undertaken and satisfactory results obtained, then both sets of results shall be included in the final report.

Annex A (informative)

Test sequence



Bibliography

Other publications

- [1] GREAT BRITAIN. The Water Supply (Water Quality) (England) Regulations 2000. Statutory Instrument 2000, No. 3184. London: The Stationery Office.
- [2] GREAT BRITAIN. The Water Supply (Water Fittings) Regulations 1999. Statutory Instrument 1999, No.1148 (England and Wales). London: The Stationery Office.
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- [5] GREAT BRITAIN. The Scottish Water Byelaws, 2004. London: The Stationery Office.
- [6] NORTHERN IRELAND. The Water Supply (Water Quality) (Amendment) Regulations (Northern Ireland) 2009. Statutory Rules of Northern Ireland 2009, No. 246. London: The Stationery Office.
- [7] NORTHERN IRELAND. The Water Supply (Water Fittings) Regulations (Northern Ireland) 2009. Statutory Rules of Northern Ireland 2009, No. 255. London: The Stationery Office.

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