

WATER REGULATIONS ADVISORY SCHEME BS6920 TEST ON EFFECT OF WATER QUALITY GUIDANCE NOTES

These Guidance Notes gives details of the BS 6920 tests and test sample requirements for Water Regulations Advisory Scheme approval. If any further information or assistance is needed concerning sample requirements and preparation please contact:

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1. TEST REQUIREMENTS

To be acceptable to the Water Regulations Advisory Scheme (WRAS) products and materials must comply with BS 6920, Suitability of non-metallic products for use in contact with water intended for human consumption with regards to their effect on the quality of the water. BS 6920 consists of five separate tests;

Test	Duration
Odour and Flavour of water	14 days
Appearance of water	14 days
Growth of microorganisms	7 weeks
The Extraction of Substances that may be of Concern to Public Health	7 days
Extraction of metals	4 weeks

The overall period to complete and report the above tests is a minimum of 10 weeks.

2. THE INDIVIDUAL TESTS

The requirements for the suitability of non-metallic products are given in BS 6920 Part 1: Specification. The methods used for the individual tests are described in full in BS 6920: Part 2: Methods of Test. Further guidance for materials testing can be found in the WRAS document WRAS Approvals Guidance Appendix A V2.8 April 2007 available from the WRAS web site.

ODOUR AND FLAVOUR OF WATER (BS 6920: Part 1 Clause 4, Part 2 Section 2.2)

This test assesses the ability of a product to impart a discernible odour or flavour to water. The test is carried out using chlorinated and non-chlorinated water and may take up to 14 days to complete.

The final non-chlorinated and chlorinated (1 mg^l⁻¹ free chlorine) extracts obtained from the product must be free from odour and the first 1:1 dilutions must be free from flavour. If more than one of the three panellists detects an odour or flavour, then the product does not comply to meet the specification. Unless two further test samples are assessed and no odour and flavour is reported in the final extracts from both additional samples.

APPEARANCE OF WATER (BS 6920: Part 1 Clause 5, Part 2 Section 2.3)

This test assesses the ability of a product to impart any noticeable colour or turbidity to water. The test may take up to 14 days to complete.

Any increase in the colour and turbidity of the final extract from the product must be less than 5 Hazen units and 0.5 FNU respectively. If any colour or turbidity is detected in the final extract, then the product does not comply with the specification unless two further samples are tested and the mean of the colour and turbidity measurements of the final extracts of all three samples comply with the specification.

GROWTH OF AQUATIC MICROORGANISMS (BS 6920: Part 1 Clause 6, Part 2 Section 2.6)

This test assesses the ability of a product to promote a significant degree of growth of aerobic microorganisms when in contact with water. This test takes 7 to 9 weeks to complete.

The mean dissolved oxygen difference (MDOD) value obtained for a product is a measure of the ability of the product to support the growth of microorganisms - as the growth of the microorganisms increases oxygen is removed from the test system and this loss is compared with the control system. Thus the greater the loss of dissolved oxygen from the water in contact with the product, so the greater the final value. MDOD is the mean value from measurements taken at weeks 5, 6 and 7.

The MDOD between the water in contact with the product and the negative control system must be less than 1.7 mg l⁻¹.

If after seven weeks the MDOD value is between 1.7 and 2.0 mg l⁻¹, then the test can be continued for a further two weeks. If the final MDOD value, over weeks five to nine, is less than 1.7 mg l⁻¹, then the product complies. If the product gives an MDOD value in the range >2.0 to 2.9 mg l⁻¹, then two further samples of the product can be tested. The arithmetic mean of the MDOD values from the three samples must be less than 2.4 mg l⁻¹ for the product to comply with the specification.

If the product gives an MDOD value greater than 2.9 mg l⁻¹ then the product does not comply with the specification and no further testing is acceptable.

NOTE

An additional reference system is included for some samples (eg cementitious products). If the reference system has a MDOD that is 0.5 mg l⁻¹ greater than the MDOD for the positive reference system (Paraffin Wax), the product is reported as showing a bacteriostatic/cidal effect, and does not comply with the specification.

Summary of Growth of Aquatic Microorganisms (MDOD) test pass requirements

MDOD on first sample, weeks 5 to 7

Result mg l ⁻¹	0 to <1.7	≥1.7 to <2.0	>2.0 to ≤2.9	>2.9
Action	Pass	Extend test by a further two weeks	Re-test with two further samples	Fail

Extended MDOD on first sample, weeks 5 to 9

Result mg l ⁻¹	<1.7	>1.7
Action	Pass	Re-test

**Re-test with two further samples
Measure MDOD of weeks 5 to 7, determine mean MDOD of all three samples**

Result mg l ⁻¹	<2.4	≥2.4
Action	Pass	Fail

**THE EXTRACTION OF SUBSTANCES THAT MAY BE OF CONCERN TO
PUBLIC HEALTH (BS 6920: Part 1 Clause 7, Part 2 Section 2.5) (Cytotoxicity
test)**

This is a simple cytotoxicity based screening test and extraction procedure designed to assist in the toxicological assessment of products. The test takes a minimum of 7 days to complete.

The aqueous extract from the product must show no toxicity to a mammalian cell line to comply with this test.

If a cytotoxic response is detected in the extract, then the product does not comply with the specification unless two further samples are tested and both samples show no cytotoxic response.

THE EXTRACTION OF METALS (BS 6920: Part 1: Clause 8, Part 2 Section 2.6)

This test assesses the leaching of metals from the product into water. This test may take up to 4 weeks to complete.

Any metal detected in the aqueous extracts from the product must be at a concentration less than the Maximum Admissible Concentration (MAC) as given in BS 6920 Part 1. Depending on the nature of the product WRAS may also specify analysis of other metals and assess the results obtained. The test is carried out on duplicate test samples and both test samples must comply with the specification.

If the MAC of any metal is exceeded in either of the duplicate final extracts from the test product then the product does not comply to meet this specification, unless three further duplicate test samples are tested and the concentrations of the specified metals in the extracts from all of three additional samples do not exceed the MAC.

The list of metals and MAC values for the Extraction of Metals Test are given below

Metal	MAC ($\mu\text{g l}^{-1}$)	Metal	MAC ($\mu\text{g l}^{-1}$)
Aluminium	200	Iron	200
Antimony	5	Lead	25
Arsenic	10	Manganese	50
Barium	1000	Mercury	1
Cadmium	5	Nickel	20
Chromium	50	Selenium	10

3. HIGH TEMPERATURE TESTS (BS 6920: Part 3)

For products likely to be used in domestic hot water services or other systems where the water temperature regularly exceeds 23 °C and the water is made available for drinking or culinary purposes at outlets, High Temperature Tests are specified. These tests can be carried out at any temperature between 30 °C and 85 °C, as specified.

Only the Odour and Flavour of Water; Appearance of Water; The Extraction of Substances that may be of Concern to Public Health and The Extraction of Metals tests are carried out at the specified high temperature. The Growth of Aquatic Microorganisms test is carried out at the normal temperature.

4. SAMPLE SPECIFICATIONS

4.1 GENERAL REQUIREMENTS

Important: - Samples submitted for testing must comply with BS 6920: Section 2.1 Samples for Testing.

For each product/material submitted for testing at least **FIVE** to **TEN** samples, depending on the nature of the product, are required. The surface area of the article or articles that constitute a sample that come into contact with the test water must total 15000 mm². For some products/materials a sample may consist of more than one article of the product / material. For example a sample of a coating may consist of one coated plate (of suitable dimensions) that is ten coated plates are required for testing. For a component, several components (e.g. five) may be needed to give the required surface area to constitute a sample for testing, i.e. 50 components would be required for testing. If a lubricant is used in conjunction with a product, the product and the lubricant must be submitted for testing separately, namely the product must be submitted without lubricant.

Each sample should be placed in a polyethylene bag (sandwich/food grade bags are ideal) and clearly identified by labelling the bag, not the sample(s).

Samples bearing adhesive tape or labels, ink or pencil marks **CANNOT** be accepted for testing.

Information on the chemical composition of the product is required for Health and Safety risk assessment. All information provided will be treated in the **strictest confidence** - if preferred confidential information may be submitted in a separate envelope marked 'Confidential', for the **personal attention of Mark Norris**.

***If you have any queries or require testing not listed above please contact
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*WRc-NSF Ltd GUIDANCE NOTES
FOR TESTING A PRODUCT FOR LISTING IN THE WATER FITTINGS AND MATERIALS
DIRECTORY*

4.2 SPECIAL REQUIREMENTS

Component Materials From Fittings And Composite Testing
For products that contain a range of non-metallic materials or are composites other requirements for testing may be specified. If the product comes into this category or clarification is required please contact Mark Norris at the address on page 1.
Non-homogeneous Products
For non-homogeneous products potable water only comes into contact with one surface, (e.g. inner surface of hoses and tanks). If a surface not intended to come into contact with potable water is prepared from a different material or finish to the water contact surface. The product(s) submitted for testing must be completely coated with the water contact material or finish. Hoses fabricated from a water contact material, reinforcing material and other material are subject to testing to BS 6920: Section 2.2.2 only. For this test two metres of the hose will be required.
Coatings And Paints
NB Coal Tar Containing Products The Water Regulations states that no pipe; pipe fitting or storage cistern shall be internally lined or coated with coal tar, or any substance that includes coal tar. The WRAS will not list any products containing coal tar, including products having coal tar coated components not in direct contact with potable water.
Factory Applied/Processed Coatings and Paints
Factory applied coatings and paints must be applied to plates of a material of similar adherent properties to that which the product is to be used. The panels must be compatible with water, i.e. non-rusting or corroding. Plates made from stainless steel or frosted glass is ideal, and can be supplied if requested. The coated plates must be given the same pre-treatment, including all primers and undercoats, maturing and curing conditions as used in normal practice. The coating or paint must be applied to all surfaces and edges. WRc-NSF can prepare the samples for test; a charge is made for this service. The dimensions of the plates must not exceed 150 mm in length and 70 mm in width The preferred plate size is 120 x 60 x 1 mm thick (surface area 15120 mm ²).

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Site-Applied Products
<p>For products such as coatings and paints that are applied on-site (by the supplier or end-user) the samples for testing must be prepared by WRc-NSF. A charge for sample preparation will be made. Preparation instructions must be supplied and include details such as; curing time, temperature, mix ratios (weight : weight), wet film thickness (microns) all necessary primers and undercoats full safety information</p> <p>The procedures used for the sample preparation and curing will be given in the final report. They will also be used as conditions in the WRAS directory listing. Samples for testing will be prepared according to BS 6920: Section 2.1, unless instructed to the contrary. Site Applied Products for testing must be supplied in their normal containers. For the preparation of samples for testing, the maximum pack size is 5 kilos for dry products and 1 litre for liquid products. Quantities of unused product in excess of these amounts will be returned or disposed; a charge will be made for this service.</p> <p>Test samples will not be prepared at WRAS unless full Health and Safety information is supplied. This information is required for our safety procedures e.g. Control of Substances Hazardous to Health Regulations. Normally a Manufacturers Safety Data Sheet will provide adequate information.</p> <p>For products that can only be prepared and/or applied using specialised equipment WRc-NSF are required to witness the preparation of the test samples and to transport the samples to WRc-NSF for testing. For these products, a site visit can be arranged; a charge will be made for this service.</p>
Plastic Products
<p>Plastic materials can be tested in either sheet or component form (pellets or granules cannot be tested and should be moulded into a suitable component). Plastic materials produced for the production of plastic pipes must be submitted in the form of extruded pipes. Please inform WRc-NSF if the plastic material contains any recycled materials and provide details of the origin of the recycled materials.</p> <p>Products such as glass reinforced polyesters; thermosetting plastic materials and glass-filled plastics must be tested in the form of the final component.</p>
Elastomeric (Rubber) Products
<p>Differences can occur between sheet, moulded and extruded elastomeric (rubber) products, depending on the final processing and curing conditions. Samples of these products must be submitted in the form of the final component. Elastomeric (rubber) products can be tested in sheet form. However, unless the sheet has received curing and post-curing treatments identical to those as given to components manufactured from the sheet materials, WRAS Directory will list the sheet material only.</p> <p>NOTE Elastomeric products are generally stored for some time before use.</p> <p>To simulate this practice, freshly cured samples should be placed in unsealed polyethylene bags and stored in a clean atmosphere for one month before being submitted for testing. However if the normal practice is to use the product within one month of production, it should be submitted for testing within a month. If a mould release agent or similar agent is used in the preparation of test samples it should be identical to that used in the manufacture of products (some mould release agents may affect the performance of elastomeric products in the tests).</p> <p>If you have any queries about the test sample requirements for elastomeric products please contact Mark Norris at the address on page 1.</p>
Lubricants
<p>A minimum of 250 grams of each lubricant, supplied in a suitable container, is required for testing. If a lubricant is used in conjunction with a product, the product and the lubricant must be submitted for testing separately, i.e. the product must be submitted without lubricant.</p>

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Flexible Hoses and Tubing
Flexible hoses and tubing should be submitted as a single 5 metre length or as five one metre lengths. See also the note above for non-homogeneous products.
Solders and Fluxes
Sufficient quantity of solder or flux, with instructions, must be supplied for application to ten joints. If a specific flux is recommended for use with the solder for test a sufficient quantity of solder and flux must be supplied for ten joints (or vice versa).
Cementitious Products and Additives
These are normally "site-applied" products and the test samples will require preparation at WRc-NSF, a charge is made for this service. All necessary materials (including the mortar/cement mix), together with full-user instructions, material safety data sheets, with health and safety information must be provided. For products that can only be prepared and/or applied using specialised equipment WRc are required to witness the preparation of the test samples and transport the test samples to WRc-NSF. For these products a site visit can be arranged, a charge is made for this service.
Small Components
A sufficient number of components to provide TEN separate composite samples. Each composite sample must have a total surface area of 15,000 mm ² . In the case of "O" rings the total number of items required to give <u>ONE</u> composite sample can be calculated as follows: Number required to give an area of 15000 mm ² = $15000/\pi^2(R^2-r^2)$ Where, R = outer radius in mm and r = inner radius in mm
Fluids for Indirect Heating Systems Please ask for details about the testing of these products.

***If you require any further information or clarification of sample requirements for testing please contact
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