

WRc-NSF

TESTING TO AS/NZS 4020 PRODUCTS FOR USE IN CONTACT WITH DRINKING WATER

GUIDANCE NOTES

These Guidance Notes gives details of the AS/NZS 4020 tests and test sample requirements for SAI Global 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 SAI Global products and materials must comply with AS/NZS 4020; Products for use in contact with drinking water.

AS/NZS 4020 consists of six separate tests,

Test	
Taste of water	14 days
Appearance of water	14 days
Growth of aquatic microorganisms	7 weeks
Cytotoxic activity	7 days
Mutagenic activity	7 weeks
Extraction of metals	4 weeks

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

2. THE INDIVIDUAL TESTS

The requirements for products and materials are given in AS/NZS 4020 Clause 6 Test Requirements. The methods used for the individual tests are described in full in AS/NZS 4020: Appendices A to J.

TASTE OF WATER (AS/NZS 4020: Appendix C)

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

The first 1:1 dilutions of the final extracts obtained from the product using chlorine-free and chlorinated (1 mg l^{-1}) water must be free from taste. If more than one of the four taste panellists detects a taste in the first dilution of these extracts, then the product fails to meet the specification. Unless two further test samples are assessed and no taste is reported in the first dilution of the final extracts from both additional samples.

APPEARANCE OF WATER (AS/NZS 4020: Appendix D)

This test assesses the ability of a product to impart any noticeable colour or turbidity to water. The test may take up to 14 working 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 (AS/NZS 4020: Appendix E

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 a minimum of 7 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 MDOD value. MDOD is the mean value over weeks 5 to 7 of the test.

The value of 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 the MDOD is greater than 2.9 mg l⁻¹ then the product has failed the test.

If the value is greater than 1.7 but less than 2.4 mg l⁻¹, then the product is deemed to have passed, if two further samples are tested and the average MDOD less than 2.4 mg l⁻¹.

If the MDOD value is between 2.4 and 2.9 mg l⁻¹ then two further samples are tested. If the average MDOD less than 2.4 mg l⁻¹, then the product has complied.

If in any of the re-tests the average result is greater than 2.4 mg l⁻¹ then the product has failed.

NOTE

An additional reference system is included for some samples (eg cementitious products). If the reference system gives an 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 test requirements.

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 <2.4	>2.4 to ≤2.9	>2.9
Action	Pass	Deemed to have passed, but re-test with two further samples	Re-test with two further samples	Fail
Average of all three samples				
Result mg l ⁻¹	<2.4		>2.4	
Action	Pass		Fail	

CYTOTOXIC ACTIVITY OF WATER EXTRACT (AS/NZS 4020: Appendix F)

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 working days to complete.

The product is exposed to the test water for periods 24, 48 and 72 hours. If the aqueous extract at the end of each of these time periods must not show any toxicity to the mammalian cell line to comply with this particular test.

If a cytotoxic response is detected in any of the extracts, then the product fails to meet the specification unless two further samples are tested and both samples show no cytotoxic response.

MUTAGENIC ACTIVITY OF WATER EXTRACT (AS/NZS 4020: Appendix G)

If a mutagenic activity is present in the product extract it is demonstrated by incorporating the extract into a bacterial cell assay system. The test takes a minimum of 7 weeks to complete.

The product is exposed to the test water for 24 hours. The aqueous extract from the product must show no mutagenic activity to comply with this particular test.

If a mutagenic response is detected in any of the extracts, then the product fails to meet the specification unless two further samples are tested and both samples show no mutagenic response.

EXTRACTION OF METALS (AS/NZS 4020: Appendix H)

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

Any metal present in the final duplicate extracts obtained from the product must be at concentrations less than the Maximum Admissible Concentration (MAC) as given in AS/NZS 4020 Part 1. 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 fails to meet this specification. Unless three further duplicate test samples of the product 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;

Metal	MAC ($\mu\text{g l}^{-1}$)	Metal	MAC ($\mu\text{g l}^{-1}$)
Antimony	3	Lead	10
Arsenic	7	Mercury	1
Barium	700	Molybdenum	50
Cadmium	2	Nickel	20
Chromium	50	Selenium	10
Copper	2000	Silver	100

3. HIGH TEMPERATURE TESTS (AS/NZS 4020: APPENDIX J)

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 40 and 100°C, as specified.

Only the Taste of Water Extract; Appearance of Water Extract, Cytotoxic Activity of Water Extract, Mutagenic Activity of Water Extract 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

The AS/NZS 4020 standard has specific requirements about the form products are tested. Wherever possible products are exposed “in the product”. However this is not always possible and so “immersion exposure” is used. On return of the completed application we can give you details of the final form and number of test samples.

Whatever form the final test samples take please note that 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 can be submitted in a separate envelope marked ‘Confidential’, for the personal attention of Mr Mark Norris.

***If you have any queries or require testing not listed above please contact
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