

WATER REGULATIONS ADVISORY SCHEME (WRAS).

**TESTING OF NON-METALLIC MATERIALS FOR USE WITH DRINKING  
WATER (BS 6920 : 2000)**

**AUDIT TEST REPORT**

Product : Shotcrete 513  
Report Reference : M 102472/B  
Page 1 of 6 Pages.

Natural Cement Distribution Ltd  
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Barnsley  
S75 1JN

Report Date : 23<sup>rd</sup> May 2001

**Executive Summary - samples of this product have been tested to the Audit Test requirements of the Water Regulations Advisory Scheme (WRAS)/BS 6920:2000 for use with Cold Water.**

***A copy of this report should be submitted to the Water Regulations Advisory Scheme (WRAS) for further advice concerning this product.***

***Conformity with the Audit Test requirements of the WRAS will be confirmed by the Scheme.***

NOTES.

1. The results given in this report relate only to the items tested, and not necessarily to the bulk from which they were taken.
2. This test work was undertaken in the UKAS accredited Spencer House laboratory of Thames Water Utilities Ltd., UKAS registration number 0677, unless otherwise stated.
3. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.
4. This test report shall not be reproduced, except in full, without our prior written approval.



**TESTING OF NON-METALLIC MATERIALS FOR USE WITH DRINKING WATER.  
WATER REGULATIONS ADVISORY SCHEME TESTS OF EFFECT ON WATER  
QUALITY (BS 6920:2000).**

**0. INTRODUCTION.**

The samples of the product referred to in this report have been tested in accordance with the methods of the Water Regulations Advisory Scheme (WRAS) Tests of Effect on Water Quality/BS 6920-2:2000 "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 : Methods of Test". **The testing undertaken is in accordance with the DWI CPP Secretariat E mail dated 10.03.01.**

**1. TEST SAMPLES.**

General composition of product	Fast Setting Dry Spray Concrete	
Trade name/designation	Shotcrete 513	
Material manufacturer	Natural Cement Distribution Ltd	
Date of production	13 <sup>th</sup> March 2001	
Production batch numbers	13031/1	
Samples prepared by	WQC Staff	
Submitting organisation	Natural Cement Distribution Ltd	
Date of receipt of test samples	16 <sup>th</sup> March 2001	
Method of packaging	Bag	
Condition on receipt	Satisfactory	
Laboratory storage before test	Ambient temperature (21±4)°C	
Description of a test article	Moulded Block	
Appearance of a test article	colour	Grey
	surface finish	Textured
	opacity	Opaque
Surface area of one article (mm <sup>2</sup> )	≈ 15000	
Number of articles to give a surface area of 15000mm <sup>2</sup>	1	
Calibration mark of the test vessel/container in litres	1	
Extraction temperature used for tests 2 & 6	(23±2)°C	

**1.1 SITE APPLIED PRODUCTS.**

Typical uses of the product	used for concrete repairs, eg in contact with potable water, repairs to sewers, work around the sea, repairs to tunnels etc
Appearance of product/component parts before mixing	Grey
Method of test sample preparation	Powder and water were mechanically mixed and cast into polycarbonate moulds.
Mix ratio (mass : mass)	25kg : 38%
Number of coats used	One
Location of sample preparation	Spencer House Laboratory
Equipment used for sample preparation	Hobart Mixer
Final curing (time and temperature)	30 minutes at (7±2)°C
<p><b>Preconditioning of Sample</b> : the samples were preconditioned in water (Aggressivity Index &gt;12.0) for four days until the pH fell below 9.0 on two consecutive days.            Preconditioning Profile (days) : pH 12.2, 10.5, 8.9, 8.9</p>	

## 2. ODOUR & FLAVOUR OF WATER TEST

Temperature of extraction : (23±2)°C

Date test started : 27.03.01.

The extracts from the samples were compared with the procedural blank test waters by a panel of 3 testers. The following results were obtained for the test extracts.

Extract	Test water	Test	Descriptors	Threshold dilutions	
<b>Sample 1</b>	First	Chlorine free	Odour	None	
		Chlorinated	Flavour	None	<1
	Chlorinated		Odour	None	
		Final	Chlorinated	Flavour	None
Chlorine free	Odour			--	
	Chlorine free	Chlorinated	Flavour	--	--
Chlorinated			Odour	--	
	Chlorinated	Chlorine free	Flavour	--	--
Chlorine free			Odour	--	

**COMMENT.** On the basis of these results the samples of this product have been found **to conform** with the requirements of BS 6920-1 : Clause 4 when extracted at 23°C.

## 6. EXTRACTION OF METALS.

Temperature of extraction : (23±2)°C

Date test started : 27.03.01.

The results obtained for the first extract are given below -

Element	Unit	MAC	Reporting limit	Sample 1	Sample 2	Reagent blank
Aluminium	Al µg/L	200	15.0	164.0	180.0	<15.0
Antimony	Sb µg/L	10	1.0	<1.0	<1.0	<1.0
Arsenic	As µg/L	50	2.0	<2.0	<2.0	<2.0
Barium	Ba µg/L	1000	10.0	15.0	16.0	<10.0
Cadmium	Cd µg/L	5	0.5	<0.5	<0.5	<0.5
Chromium	Cr µg/L	50	5.0	<5.0	<5.0	<5.0
Iron	Fe µg/L	200	20.0	27.0	22.0	<20.0
Lead	Pb µg/L	50	5.0	<5.0	<5.0	<5.0
Manganese	Mn µg/L	50	5.0	<5.0	<5.0	<5.0
Mercury	Hg µg/L	1	0.05	<0.05	<0.05	<0.05
Nickel	Ni µg/L	50	5.0	<5.0	<5.0	<5.0
Selenium	Se µg/L	10	1.0	<1.0	<1.0	<1.0
Silver	Ag µg/L	10	1.0	<1.0	<1.0	<1.0

### **Extract Analytical.**

The analysis of the extracts for these metals was undertaken in the Millharbour Laboratories of Thames Water, UKAS registration number 1258.

*Mercury, arsenic, selenium, antimony and lead* - inductively coupled plasma mass spectrometry [method code 407].

*Aluminium, barium, cadmium, chromium, iron, lead, manganese, nickel and silver* - inductively coupled plasma optical emission spectrometry [method code 385].

*Analytical Control Data* - these three techniques are in continuous use for analysis of drinking water metals; all of these techniques are fully validated to the requirements of "A Manual on Analytical Quality Control for the Water Industry" (NS 30) and the requirements laid down by the Drinking Water Inspectorate. Each technique has a comprehensive AQC protocol including control solutions and spike recovery testing with each batch of samples for analysis; full details available upon request.

**COMMENT.** On the basis of these results the samples of this product have been found **to conform** with the requirements of BS 6920-1 : Clause 8 when extracted at 23°C.

**CONCLUSIONS.**

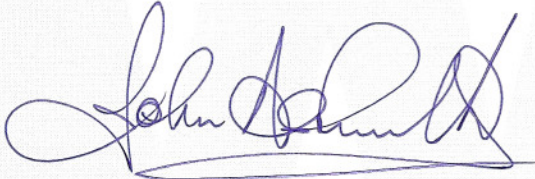
**The samples of this product have been tested in accordance with the Audit Test requirements of the Water Regulations Advisory Scheme (WRAS) for use with cold but not hot water.**

***A copy of this report should be submitted to the Water Regulations Advisory Scheme (WRAS) for further advice concerning this product.***

NOTE : materials and products intended for use by a public water supply company in the preparation or conveyance of water may need to satisfy more comprehensive toxicological requirements as set specified by the Drinking Water Inspectorate. These additional requirements are necessary to ensure legal compliance with Regulation 25 of the Water Supply (Water Quality) Regulations 1989.

**NO OTHER TESTS WERE UNDERTAKEN ON THIS PRODUCT.****NOTES -**

1. The results specified in this report relate to the samples submitted for evaluation and not necessarily to the bulk from which they were taken. Any changes in the nature or source of ingredients and the process of manufacture or application could affect the suitability of the product for use in contact with drinking water.
2. We would draw to your attention that reports issued by the accredited test laboratories do not of themselves constitute approval by the Water Regulations Advisory Scheme (WRAS) or the test laboratory. Only a letter from the Scheme, citing a Directory Reference Number, can be regarded as indicating approval.



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