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Arad Ltd
Attn: Michaela Avraham
Kibbutz Dalia

19239
ISRAEL

11/04/2014

Dear Michaela,

Please find the attached report to AS/NZS 4020:2005 for Water Meter - Metal Body OCTAVE (2" Representative) submitted for testing.

Should you have any enquiries about the report or any other matters pertaining to the Standard please contact the laboratory on 61 8 7424 1512

Yours sincerely,

A handwritten signature in blue ink, appearing to read "Peter Christopoulos", is written over a light blue horizontal line.

Peter Christopoulos
Snr Technical Officer Micro



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Chemical and Biological Testing
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FINAL REPORT

Report ID : 136007

Report Information

Submitting Organisation : 00121312 : Arad Ltd
Account : 142320 : Arad Ltd
AWQC Reference : 142320-2013-CSR-1 : Prod Test: Coated Ductile Iron Body Water Meter
Project Reference : PT-2276
Product Designation : Water Meter - Metal Body OCTAVE (2" Representative)
Composition of Product : Epoxy Coated Cast Ductile Iron (see attachment 1 for further information).
Product Manufacturer : Arad Ltd., Kibbutz Dalia, ISRAEL.
Use of Product : In-Line/ Water Meter.
Sample Selection: As provided by the submitting organisation.
Testing Requested : **AS/NZS 4020:2005 TESTING OF PRODUCTS FOR USE IN CONTACT WITH DRINKING WATER**
Product Type : Composite
Samples : Samples were prepared and controlled as described in Appendix A of AS/NZS 4020:2005

Extracts : Extracts were prepared as described in Appendix C, D, E, F, G, H.
Project Completion Date : 11-Apr-2014
Project Comment : The results presented herein demonstrate compliance of Water Meter - Metal Body OCTAVE (2" Representative Sample) to AS/NZS 4020 when tested at the 'in-the-product' exposure with a 0.1 scaling factor at 20°C ± 2°C. Product range to include 2" to 12".

PLEASE NOTE THAT THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL

THE RESULTS STATED IN THIS REPORT RELATE TO THE SAMPLE OF THE PRODUCT SUBMITTED FOR TESTING. ANY CHANGES IN THE MATERIAL FORMULATION, PROCESS OF MANUFACTURE, THE METHOD OF APPLICATION, OR THE SURFACE AREA-TO-VOLUME RATIO IN THE END USE, COULD AFFECT THE SUITABILITY OF THE PRODUCT FOR USE IN CONTACT WITH DRINKING WATER



Michael Glasson
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Summary of Results

APPENDIX	RESULTS
C – Taste of Water Extract	Passed at the in-the-product exposure with a scaling factor of 0.1 applied.
D – Appearance of Water Extract	Passed at the in-the-product exposure with a scaling factor of 0.1 applied.
E – Growth of Aquatic Micro-organisms	Passed when tested at the in-use exposure.
F – Cytotoxic Activity of Water Extract	Passed at the in-the-product exposure with a scaling factor of 0.1 applied.
G – Mutagenic Activity of Water Extract	Passed at the in-the-product exposure with a scaling factor of 0.1 applied.
H – Extraction of Metals	Passed at the in-the-product exposure with a scaling factor of 0.1 applied.

Test Methods

Test(s) in Appendix	AWQC Test Method	Reference Method
C	T0320-01	AS/NZS 4020:2005
D	TO029-01 & TO018-01	APHA 2130b
E	TO014-03	APHA 4500 O C
F	TM-001	AS/NZS 4020:2005
G	TM-002	AS/NZS 4020:2005
H	TIC-006	EPA 200.8

Summary Comment : Not applicable.

FINAL REPORT

Report ID : 136007

CLAUSE 6.2 Taste of Water Extract

Sample Description	The meter was tested at the in-the-product exposure. Each meter held approximately 250 mL of water. Extracts were prepared using 1000 mL volumes of 50 mg/L hardness water.
Extraction Temperature	20°C ± 2°C.
Test Method	Taste of Water Extract (Appendix C)
Test Information	
Scaling Factor	A scaling factor of 0.1 was applied.
Results	Not detected.
Evaluation	The product passed the requirements of clause 6.2 when tested at the in-the-product exposure with a scaling factor of 0.1 applied.
Number of Samples	2.
Test Comment	Not applicable.



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Report ID : 136007

CLAUSE 6.3 Appearance of Water Extract

Sample Description The meter was tested at the in-the-product exposure. Each meter held approximately 250 mL of water. Extracts were prepared using 1000 mL volumes of 50 mg/L hardness water.

Extraction Temperature 20°C ± 2°C.

Test Method Appearance of Water Extract (Appendix D)

Scaling Factor A scaling factor of 0.1 was applied.

Results

	<u>Test (- Blank)</u>	<u>Maximum Allowed</u>	<u>Units</u>
Colour	<1	5	HU
Turbidity	<0.1	0.5	NTU

Evaluation The product passed the requirements of clause 6.3 when tested at the in-the-product exposure with a scaling factor of 0.1 applied.

Number of Samples 1.

Test Comment Not applicable.



Joanne Clark
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CLAUSE 6.4 Growth of Aquatic Micro-organisms

Sample Description The non-metallic components were immersed at the in-use exposure. The surface area was in the range 1000 mm² per Litre and 15,000 mm² per Litre. Extracts were prepared using 1000 mL volumes of test water.

Test Method Growth of Aquatic Micro-organisms (Appendix E)

Inoculum The volume of the inoculum was 100 mL

Scaling Factor Not applicable.

Results

Mean Dissolved Oxygen	Control	7.2 mg/L
Mean Dissolved Oxygen Difference	Positive Reference	5.4 mg/L
	Negative Reference	<0.1 mg/L
	Test	<0.10 mg/L

Evaluation The product passed the requirements of clause 6.4 when tested at the in-use exposure.

Number of Samples 1.

Test Comment Not applicable.



Stephanie Semczuk
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CLAUSE 6.5 Cytotoxic Activity of Water Extract

Sample Description The meter was tested at the in-the-product exposure. Each meter held approximately 250 mL of water. Extracts were prepared using 1000 mL volumes of 50 mg/L hardness water.

Extraction Temperature 20°C ± 2°C.

Test Method Cytotoxic Activity of Water Extract (Appendix F)

Scaling Factor A scaling factor of 0.1 was applied.

Results Non Cytotoxic.

Evaluation The product passed the requirements of clause 6.5 when tested at the in-the-product exposure with a scaling factor of 0.1 applied.

Number of Samples 1.

Test Comment The test extracts and blank extracts were used to prepare nutrient growth medium and subsequently used to grow a cell line (ATCC Number CCL 81) in the analysis. In addition zinc sulphate (0.4 mmol) was used for the positive control in the analysis.



Brendon King
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CLAUSE 6.6 Mutagenic Activity of Water Extract

Sample Description The meter was tested at the in-the-product exposure. Each meter held approximately 250 mL of water. Extracts were prepared using 1000 mL volumes of 50 mg/L hardness water.

Extraction Temperature 20°C ± 2°C.

Test Method Mutagenic Activity of Water Extract (Appendix G)

Scaling Factor A scaling factor of 0.1 was applied.

Results

Bacteria Strain	Number of Revertants per Plate				
	S9	Blank	Sample Extract	Positive Controls	
<i>Salmonella typhimurium</i> TA98	-	20, 26, 22	31, 26, 34	2187, 2475, 2161	<u>NPD</u> (20µg)
Mean ± Standard deviation		22.7 ± 3.1	30.3 ± 4.0	2274.3 ± 174.3	
	+	12, 18, 15	28, 28, 46	2238, 2237, 2429	<u>2-AF</u> (20µg)
Mean ± Standard deviation		15.0 ± 3.0	34.0 ± 10.4	2301.3 ± 110.6	
<i>Salmonella typhimurium</i> TA100	-	598, 565, 592	486, 465, 440	1821, 1831, 1810	<u>Azide</u> (1.0µg)
Mean ± Standard deviation		585.0 ± 17.6	463.7 ± 23.0	1820.7 ± 10.5	
	+	271, 264, 320	336, 341, 361	3063, 2589, 3051	<u>2-AF</u> (20µg)
Mean ± Standard deviation		285.0 ± 30.5	346.0 ± 13.2	2901.0 ± 270.3	
<i>Salmonella typhimurium</i> TA102	-	721, 709, 676	760, 728, 783	3218, 3345, 3266	<u>Mitomycin C</u> (10µg)
Mean ± Standard deviation		702.0 ± 23.3	757.0 ± 27.6	3276.3 ± 64.1	
	+	670, 749, 835	717, 749, 878		
Mean ± Standard deviation		751.3 ± 82.5	781.3 ± 85.2		

Comments S9 was used as a metabolic activator. NPD (4-nitro-o-phenylenediamine), Azide, and Mitomycin C are specific positive controls for strains TA98, TA100 and TA102 respectively while 2 - AF (2-aminofluorene) when used in conjunction with S9 is a positive control for both TA98 and TA100

Evaluation The product passed the requirements of clause 6.6 when tested at the in-the-product exposure with a scaling factor of 0.1 applied.

Number of Samples 1.

Test Comment Not applicable.



Peter Christopoulos
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CLAUSE 6.7 Extraction of Metals

Sample Description The meter was tested at the in-the-product exposure. Each meter held approximately 250 mL of water. Extracts were prepared using 1000 mL volumes of 50 mg/L hardness water.

Extraction Temperature 20°C ± 2°C.

Test Method Extraction of Metals (Appendix H)

Scaling Factor A scaling factor of 0.1 was applied.

Method of Analysis All methods used to determine concentrations of metals are based on those described in the 21st edition of Standard Methods for the Examination of Water and Wastewater published by the APHA, AWWA and WEF (2005). The methods have been adapted for the instrumentation in use at the Australian Water Quality Centre.
Concentration of the metals described in Table 2 of the AS/NZS 4020:2005 are determined as follows:
Antimony, Arsenic, Barium, Cadmium, Chromium, Copper, Lead, Mercury, Molybdenum, Nickel, Selenium and Silver by Inductively Coupled Plasma Mass Spectrometry.

Results	Limit of Reporting mg/L	Blank mg/L	Test 1 mg/L	Test 2 mg/L	Max Allowed mg/L
Final Extract					
Antimony	0.0005	<0.0005	<0.0005	<0.0005	0.003
Arsenic	0.0003	<0.0003	<0.0003	<0.0003	0.007
Barium	0.0005	<0.0005	0.0410	0.0426	0.7
Cadmium	0.0001	<0.0001	<0.0001	<0.0001	0.002
Chromium	0.0001	<0.0001	<0.0001	<0.0001	0.05
Copper	0.0001	<0.0001	0.0003	0.0002	2.0
Lead	0.0001	<0.0001	0.0001	0.0001	0.01
Mercury	0.00003	<0.00003	<0.00003	<0.00003	0.001
Molybdenum	0.0001	<0.0001	<0.0001	<0.0001	0.05
Nickel	0.0001	<0.0001	<0.0001	<0.0001	0.02
Selenium	0.0001	<0.0001	<0.0001	<0.0001	0.01
Silver	0.00003	<0.00003	0.00019	0.00041	0.1

Evaluation The product passed the requirements of clause 6.7 when tested at the in-the-product exposure with a scaling factor of 0.1 applied.

Number of Samples 1.

Test Comment Not applicable.



Dzung Bui
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AS/NZS 4020:2005

Attachment 1

REPORT NUMBER 136007
SAMPLE REFERENCE PT-2276
DATE 11/04/2014

A. MATERIAL		B. COMPONENTS		C. FITTINGS/ASSEMBLED PRODUCT	
Name & Code	Manufacturer/ Supplier	Name & Code	Manufacturer/ Supplier	Name & Code	Manufacturer/ Supplier
VICTREX PEEK 450G BEIGE	VICTREX	96210209 D-FLOW SENSOR WIRE L=260mm	D-FLOW	Octave 2"-12"	ARAD Ltd.
29403603 PPO +30% GF (GFN 1630V- 73701(BLACK))	SUKEET (SABIC)	26353109 (exist only in 2" w/m) INLET FLOW TUBE OCTAVE 2	ARAD Ltd.		
29403603 PPO +30% GF (GFN 1630V- 73701(BLACK))	SUKEET (SABIC)	26353309 (exist only in 3" w/m) INLET FLOW TUBE OCTAVE 2	ARAD Ltd.		
29403603 PPO +30% GF (GFN 1630V- 73701(BLACK))	SUKEET (SABIC)	24630009 (exist only in 4" w/m) FLOW STRAIGHTNER OCTAVE 4	ARAD Ltd.		
29813006 SILICONE SEALANT (DC CLEAR 781,CLEAR SILICONE SEALANT)	DOW CORNING EUROPE SA				
29908056 POWDER EPOXY COATING (RESICOAT R4- ES-HJF10R)	AKZO NOBEL POWDER COATING				

