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Australian Water Quality Centre

LiquiMix Pty Ltd
Attn: Neill Barrell
24 Rosa Place
Richlands
QLD 4077
AUSTRALIA

25/09/2017

Dear Neill,

Please find the attached report to AS/NZS 4020:2005 for Civilox-18 (Light Grey) + Tufflon P-90 (White) System 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,

Michael Glasson
Supervisor Product Testing

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Australian Water Quality Centre

FINAL REPORT

Report ID : 212097

Report Information

Submitting Organisation	00120664 : LiquiMix Pty Ltd
Account :	141294 : LiquiMix Pty Ltd
AWQC Reference :	141294-2017-CSR-2 : Prod Test: Civilox-18 (Light Grey) + Tufflon P-90 (White) Syste
Project Reference :	PT-3135
Product Designation :	Civilox-18 (Light Grey) + Tufflon P-90 (White) System
Composition of Product :	Phenalkamine/Polyurea.
Product Manufacturer :	Liquimix, Richlands, QLD, AUSTRALIA.
Use of Product :	In-Line/Potable Water Lining.
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	25-Sep-2017
Project Comment :	The results presented herein demonstrate compliance to AS/NZS4020 for the Civilox -18 (Light Grey) + Tufflon P-90 (White) System when tested at a surface area to volume ratio less than or equal to 1666/5000 mm² per Litre and 20°C ± 2°C.

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
APPROVED SIGNATORY

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Summary of Results

APPENDIX	RESULTS
C – Taste of Water Extract	Passed at an exposure of 1666/5000 mm² per Litre.
D – Appearance of Water Extract	Passed at an exposure of 5000/15000 mm² per Litre.
E – Growth of Aquatic Micro-organisms	Passed at an exposure of 2950/8850 mm² per Litre (scaling factor of 0.59 applied).
F – Cytotoxic Activity of Water Extract	Passed at an exposure of 5000/15000 mm² per Litre.
G – Mutagenic Activity of Water Extract	Passed at an exposure of 5000/15000 mm² per Litre.
H – Extraction of Metals	Passed at an exposure of 5000/15000 mm² per Litre.

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 : The sample was applied and cured by the submitting organisation.

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CLAUSE 6.2 Taste of Water Extract

Sample Description	The primer/topcoat scheme provided a surface area of approximately 1666/5000 mm² per Litre. Extracts were prepared using 1000 mL volumes of test water.
Extraction Temperatur	20°C ± 2°C.
Test Method	Taste of Water Extract (Appendix C)
Test Information	
Scaling Factor	Not applied.
Results	Not detected.
Evaluation	The product passed the requirements of clause 6.2 when tested at an exposure of 5000 mm² per litre.
Number of Samples	4.
Test Comment	Panellists detected plastic tastes when tested at 2950/8850 mm²/L at 20°C. The test was repeated at 1666/5000 mm²/L at 20°C where no tastes were detected, meeting the requirements of Clause 6.2.

Peter Christopoulos
APPROVED SIGNATORY

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CLAUSE 6.3 Appearance of Water Extract

Sample Description The primer/topcoat scheme provided a surface area of approximately 5000/15000 mm² per Litre. Extracts were prepared using 1000 mL volumes of 50 mg/L hardness water.

Extraction Temperatur 20°C ± 2°C.

Test Method Appearance of Water Extract (Appendix D)

Scaling Factor Not applied.

Results

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

Evaluation The product passed the requirements of clause 6.3 when tested at an exposure of 15000 mm² per litre.

Number of Samples 1.

Test Comment Not applicable.

Andrew Paul Ford

Andrew Ford
APPROVED SIGNATORY

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CLAUSE 6.4 Growth of Aquatic Micro-organisms

Sample Description The primer/topcoat scheme provided a surface area of approximately 5000/15000 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 A scaling factor of 0.59 applied.

Results

Mean Dissolved Oxygen	Control	8.2	mg/L
Mean Dissolved Oxygen Differenc	Positive Reference	6.6	mg/L
	Negative Reference	0.3	mg/L
	Test	1.20	mg/L

Evaluation The product passed the requirements of clause 6.4 when tested at an exposure of 8850 mm² per litre with a scaling factor of 0.59 applied.

Number of Samples 1.

Test Comment The Mean Dissolved Oxygen Difference in the extracts exceeded the maximum allowable concentration. A scaling factor of 0.59 was applied.

Thuy Diep
APPROVED SIGNATORY

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CLAUSE 6.5 Cytotoxic Activity of Water Extract

Sample Description	The primer/topcoat scheme provided a surface area of approximately 5000/15000 mm² per Litre. Extracts were prepared using 1000 mL volumes of 50 mg/L hardness water.
Extraction Temperatur	20°C ± 2°C.
Test Method	Cytotoxic Activity of Water Extract (Appendix F)
Scaling Factor	Not applied.
Results	Non-cytotoxic.
Evaluation	The product passed the requirements of clause 6.5 when tested at an exposure of 15000 mm² per litre.
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
APPROVED SIGNATORY

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CLAUSE 6.6 Mutagenic Activity of Water Extract

Sample Description The primer/topcoat scheme provided a surface area of approximately 5000/15000 mm² per Litre. Extracts were prepared using 1000 mL volumes of 50 mg/L hardness water.

Extraction Temperatur 20°C ± 2°C.

Test Method Mutagenic Activity of Water Extract (Appendix G)

Scaling Factor Not applied.

Results

Bacteria Strain	S9	Blank	Sample Extract	Positive Controls	
		Number of Revertants per Plate			
Salmonella typhimurium TA98	-	46, 54, 53	46, 57, 64	3023, 3069, 2896	NPD (20µg)
Mean ± Standard deviation		51.0 ± 4.4	55.7 ± 9.1	2996.0 ± 89.6	
	+	42, 57, 54	46, 45, 47	2390, 2876, 2830	2-AF (20µg)
Mean ± Standard deviation		51.0 ± 7.9	46.0 ± 1.0	2698.7 ± 268.3	
Salmonella typhimurium TA100	-	604, 506, 550	666, 631, 597	1425, 1458, 1453	Azide (1.0µg)
Mean ± Standard deviation		553.3 ± 49.1	631.3 ± 34.5	1445.3 ± 17.8	
	+	376, 404, 378	327, 329, 342	1959, 1775, 1700	2-AF (20µg)
Mean ± Standard deviation		386.0 ± 15.6	332.7 ± 8.1	1811.3 ± 133.3	
Salmonella typhimurium TA102	-	761, 628, 611	754, 743, 742	2806, 2481, 2070	Mitomycin C(10µg)
Mean ± Standard deviation		666.7 ± 82.1	746.3 ± 6.7	2452.3 ± 368.8	
	+	722, 820, 636	708, 728, 771	1756, 1633, 1512	
Mean ± Standard deviation		726.0 ± 92.1	735.7 ± 32.2	1633.7 ± 122.0	

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 an exposure of 15000 mm² per litre.

Number of Samples 1.

Test Comment Not applicable.

Peter Christopoulos
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CLAUSE 6.7 Extraction of Metals

Sample Description The primer/topcoat scheme provided a surface area of approximately 5000/15000 mm² per Litre. Extracts were prepared using 1000 mL volumes of 50 mg/L hardness water.

Extraction Temperatur 20°C ± 2°C.

Test Method Extraction of Metals (Appendix H)

Scaling Factor Not 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

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	<0.0005	<0.0005	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	<0.0001	<0.0001	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	<0.00003	<0.00003	0.1

Evaluation The product passed the requirements of clause 6.7 when tested at an exposure of 15000 mm² per litre.

Number of Samples 1.

Test Comment Not applicable.

Dzung Bui
APPROVED SIGNATORY

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