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Rhino Linings Australasia Pty Ltd
Attn: Steve Murphy
31 Activity Crescent
Molendinar
QLD 4214
AUSTRALIA

15/01/2019

Dear Steve,

Please find the attached report to AS/NZS 4020:2005 for Rhino PP1195 Pure Polyurea 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 black ink, appearing to read "M Glasson", is written over a light blue horizontal line.

Michael Glasson
Supervisor Product Testing



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Chemical and Biological Testing
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FINAL REPORT

Report ID : 243026

Report Information

Submitting Organisation : 00109322 : Rhino Linings Australasia Pty Ltd
Account : 130299 : Rhino Linings Australasia Pty Ltd - AS/NZS 4020 Testing
AWQC Reference : 130299-2018-CSR-2 : Prod Test: PP1195 Polymer
Project Reference : PT-3648
Product Designation : Rhino PP1195 Pure Polyurea
Composition of Product : Pure Polyurea - Spray Applied Elastomer
Product Manufacturer : Rhino Linings Australasia Pty Ltd, Gold Coast, Qld, Australia
Use of Product : Industrial Lining for Tanks, Waterproof Membranes and Corrosion Protective Membranes
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 : 15-Jan-2019
Project Comment : The results presented herein demonstrate compliance of Rhino PP1195 Pure Polyurea to AS/NZS 4020:2005 when exposed at area to volume ratios up to 9600 mm²/L at 20°C ± 2°C.

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



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Summary of Results

APPENDIX	RESULTS
C – Taste of Water Extract	Passed at an exposure of 9600 mm ² per Litre.
D – Appearance of Water Extract	Passed at an exposure of 15000 mm ² per Litre.
E – Growth of Aquatic Micro-organisms	Passed at an exposure of 9600 mm ² per Litre.
F – Cytotoxic Activity of Water Extract	Passed at an exposure of 15000 mm ² per Litre.
G – Mutagenic Activity of Water Extract	Passed at an exposure of 15000 mm ² per Litre.
H – Extraction of Metals	Passed at an exposure of 15000 mm ² per Litre.

Test Methods

Test(s) in Appendix	AWQC Test Method	Reference Method
C	T0320-01	AS/NZS 4020:2018
D	TO029-01 & TO018-01	APHA 2130b
E	TO014-03	APHA 4500 O C
F	TM-001	AS/NZS 4020:2018
G	TM-002	AS/NZS 4020:2018
H	TIC-006	EPA 200.8

Summary Comment : Not applicable

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Report ID : 243026

CLAUSE 6.2 Taste of Water Extract

Sample Description	The sample consisted of a panel of material with dimensions 75 mm x 100 mm providing a surface area of approximately 9600 mm ² per Litre. Extracts were prepared using 1565 mL volumes of 50 mg/L hardness water.
Extraction Temperatur	20°C ± 2°C.
Test Method	Taste of Water Extract (Appendix C)
Test Information	
Scaling Factor	Not applied.
Results	Not detected (sample and controls).
Evaluation	The product passed the requirements of clause 6.2 when tested at an exposure of 9600 mm ² per Litre.
Number of Samples	2
Test Comment	Not applicable.



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CLAUSE 6.3 Appearance of Water Extract

Sample Description The sample consisted of a panel of material with dimensions 75 mm x 100 mm providing a surface area of approximately 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.

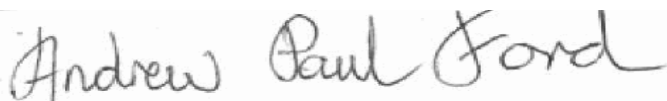
Results

	<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 an exposure of 15000 mm² per Litre.

Number of Samples 1

Test Comment Not applicable.



Andrew Ford
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CLAUSE 6.4 Growth of Aquatic Micro-organisms

Sample Description The sample consisted of a panel of material with dimensions 75 mm x 100 mm providing a surface area of approximately 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 0.73 was applied.

Results

Mean Dissolved Oxygen	Control	7.4 mg/L
Mean Dissolved Oxygen Differenc	Positive Reference	5.2 mg/L
	Negative Reference	0.1 mg/L
	Test	1.60 mg/L

Evaluation The product passed the requirements of clause 6.4 when tested at an exposure of 9600 mm² per Litre with a 0.73 scaling factor applied.

Number of Samples 1

Test Comment The Mean Dissolved Oxygen Difference in the extracts exceeded the maximum allowable concentration. A scaling factor of 0.73 was applied.



Thuy Diep
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CLAUSE 6.5 Cytotoxic Activity of Water Extract

Sample Description	The sample consisted of a panel of material with dimensions 75 mm x 100 mm providing a surface area of approximately 15000 mm ² 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 mm ² 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.



Stella Fanok
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Report ID : 243026

CLAUSE 6.6 Mutagenic Activity of Water Extract

Sample Description The sample consisted of a panel of material with dimensions 75 mm x 100 mm providing a surface area of approximately 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	Number of Revertants per Plate				
	S9	Blank	Sample Extract	Positive Controls	
<i>Salmonella typhimurium</i> TA98	-	51, 38, 45	37, 27, 35	3714, 3576, 3913	<u>NPD</u> (20µg)
Mean ± Standard deviation		44.7 ± 6.5	33.0 ± 5.3	3734.3 ± 169.4	
	+	41, 36, 33	29, 37, 39	3016, 3400, 3104	<u>2-AF</u> (20µg)
Mean ± Standard deviation		36.7 ± 4.0	35.0 ± 5.3	3173.3 ± 201.2	
<i>Salmonella typhimurium</i> TA100	-	148, 170, 141	121, 145, 179	837, 830, 881	<u>Azide</u> (1.0µg)
Mean ± Standard deviation		153.0 ± 15.1	148.3 ± 29.1	849.3 ± 27.6	
	+	185, 181, 181	154, 153, 174	1825, 2042, 1958	<u>2-AF</u> (20µg)
Mean ± Standard deviation		182.3 ± 2.3	160.3 ± 11.8	1941.7 ± 109.4	
<i>Salmonella typhimurium</i> TA102	-	469, 555, 537	439, 468, 430	5309, 4732, 4184	<u>Mitomycin C</u> (10µg)
Mean ± Standard deviation		520.3 ± 45.4	445.7 ± 19.9	4741.7 ± 562.6	
	+	568, 585, 537	612, 605, 620	3624, 3290, 3491	
Mean ± Standard deviation		563.3 ± 24.3	612.3 ± 7.5	3491.0 ± 168.1	

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.



Heather Menzies
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CLAUSE 6.7 Extraction of Metals

Sample Description The sample consisted of a panel of material with dimensions 75 mm x 100 mm providing a surface area of approximately 15000 mm² per Litre. 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 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	0.0002	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	<0.00003	<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.



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