

## FINAL REPORT

### Report Information

**Report ID :** 76943  
**Submitting Organisation :** 00120857 : AHI Roofing  
**Account :** 141570 : AHI Roofing  
**AWQC Reference :** 141570-2010-CSR-1 : Prod Test: Teak/Garnet/Painted  
**Project Reference :** PT-1263  
**Product Designation :** Teak (stone Chip), Garnet (coloured stone chip) and painted roofing products.  
**Composition of Product :** Teak - Mixture of Natural Basalt and Chert Stone Chips, Garnet - Chert Stone Chip  
Ceramically coated with Iron Oxide/Silicate Coating and Painted - Representative Colour  
for Painted Products (see attachment for further information).  
**Product Manufacturer :** AHI Roofing, Auckland, NEW ZEALAND, Varpalota, HUNGARY and Nilai, MALAYSIA.  
**Use of Product :** In-Line/Roofing Material.  
**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-Nov-2010  
**Project Comment :** The results presented herein demonstrate compliance of Natural Stone Chip coated,  
Ceramic Coloured Stone Chip coated to AS/NZS 4020 when exposed at area to volume  
ratios up to 13200 mm<sup>2</sup> per litre (6600 mm<sup>2</sup> per Litre - Garnet & 6900 mm<sup>2</sup> per Litre -  
Teak).

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 when tested at an exposure of 13200 mm <sup>2</sup> per litre (painted), 6600 mm <sup>2</sup> per Litre (Garnet) and 6900 mm <sup>2</sup> per Litre (Teak).
D – Appearance of Water Extract	Passed when tested at an exposure of 15000 mm <sup>2</sup> per litre.
E – Growth of Aquatic Micro-organisms	Passed when tested at an exposure of 13200 mm <sup>2</sup> per litre (painted), 6600 mm <sup>2</sup> per Litre (Garnet) and 6900 mm <sup>2</sup> per Litre (Teak).
F – Cytotoxic Activity of Water Extract	Passed when tested at an exposure of 15000 mm <sup>2</sup> per Litre.
G – Mutagenic Activity of Water Extract	Passed when tested at an exposure of 15000 mm <sup>2</sup> per Litre.
H – Extraction of Metals	Passed when tested at an exposure of 15000 mm <sup>2</sup> per Litre.

**Summary Comment :** Not applicable.

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### CLAUSE 6.2 Taste of Water Extract

<b>Sample Description</b>	The sample consisted of 2 panels for each material with dimensions 75 mm x 100 mm providing a surface area of approximately 13200 mm <sup>2</sup> /L, 6600 mm <sup>2</sup> /L and 6900 mm <sup>2</sup> /L. Extracts were prepared using 500 mL volumes of 50 mg/L hardness water.
<b>Extraction Temperature</b>	20°C ± 2°C.
<b>Test Method</b>	Taste of Water Extract (Appendix C)
<b>Test Information</b>	
<b>Scaling Factor</b>	Not applied.
<b>Results</b>	Not detected.
<b>Evaluation</b>	The product passed the requirements of clause 6.2 when tested at exposures of 13200 mm <sup>2</sup> per Litre (Painted), 6600 mm <sup>2</sup> per Litre (Garnet) and 6900 mm <sup>2</sup> per Litre (Teak) for each material.
<b>Number of Samples</b>	3.
<b>Test Comment</b>	Each colour scheme was tested individually.



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### CLAUSE 6.3 Appearance of Water Extract

**Sample Description** The sample consisted of 6 panels (two panels for each material) with dimensions 75 mm x 100 mm providing a surface area of approximately 15,000 mm<sup>2</sup> per Litre for each material. 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** 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 mm<sup>2</sup> per Litre for each material.

**Number of Samples** 1.

**Test Comment** Not applicable.



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### CLAUSE 6.4 Growth of Aquatic Micro-organisms

**Sample Description** The sample consisted of six panels (two panels for each material) with dimensions 75 mm x 100 mm providing a surface area of approximately 15000 mm<sup>2</sup> per Litre for each material. Extracts were prepared using 1000 mL volumes of volumes of test water.

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

**Inoculum** The volume of the inoculum was 100 mL

**Scaling Factor** Scaling factors of 0.88, 0.44 and 0.46 applied.

#### Results

Mean Dissolved Oxygen	Control	7.4 mg/L
Mean Dissolved Oxygen Difference	Positive Reference	5.8 mg/L
	Negative Reference	0.1 mg/L
	Test	4.90 mg/L

**Evaluation** The product passed the requirements of clause 6.4 when tested at exposures of 13200 mm<sup>2</sup> per Litre (Painted), 6600 mm<sup>2</sup> per Litre (Garnet) and 6900 mm<sup>2</sup> per Litre (Teak).

**Number of Samples** 4.

**Test Comment** The MDOD value exceeded the maximum allowable concentration. Each sample tested separately. The arithmetic mean of the three MDOD values provided a values of 5.67 mg/L, 3.88 mg/L and 4.03 mg/L (scaling factors of 0.88, 0.44 and 0.46 applied).



Stephanie Semczuk  
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### CLAUSE 6.5 Cytotoxic Activity of Water Extract

<b>Sample Description</b>	The sample consisted of 6 panels(two panels for each material)with dimensions 75 mm x 100 mm providing a surface area of approximately 15,000 mm <sup>2</sup> per Litre for each material. Extracts were prepared using 1000 mL volumes of 50 mg/L hardness water.
<b>Extraction Temperature</b>	20°C ± 2°C.
<b>Test Method</b>	Cytotoxic Activity of Water Extract (Appendix F)
<b>Scaling Factor</b>	Not applied.
<b>Results</b>	Non-cytotoxic.
<b>Evaluation</b>	The product passed the requirements of clause 6.5 when tested at an exposure of 15,000 mm <sup>2</sup> per Litre for each material.
<b>Number of Samples</b>	2.
<b>Test Comment</b>	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 sample consisted of 6 panels (two panels for each material) with dimensions 75 mm x 100 mm providing a surface area of approximately 15,000 mm<sup>2</sup> per Litre for each material. 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** Not applied.

#### Results

Bacteria Strain	Number of Revertants per Plate				
	S9	Blank	Sample Extract	Positive Controls	
<i>Salmonella typhimurium</i> TA98	-	34, 48, 41	27, 28, 32	3363, 3225, 3557	<u>NPD</u> (20µg)
Mean ± Standard deviation		41.0 ± 7.0	29.0 ± 2.6	3381.7 ± 166.8	
	+	57, 35, 42	34, 31, 32	2534, 2699, 2908	<u>2-AF</u> (20µg)
Mean ± Standard deviation		44.7 ± 11.2	32.3 ± 1.5	2713.7 ± 187.4	
<i>Salmonella typhimurium</i> TA100	-	130, 126, 133	118, 131, 106	770, 769, 785	<u>Azide</u> (1.0µg)
Mean ± Standard deviation		129.7 ± 3.5	118.3 ± 12.5	774.7 ± 9.0	
	+	133, 145, 113	102, 114, 105	1037, 1023, 1047	<u>2-AF</u> (20µg)
Mean ± Standard deviation		130.3 ± 16.2	107.0 ± 6.2	1035.7 ± 12.1	
<i>Salmonella typhimurium</i> TA102	-	414, 451, 476	385, 436, 422	1445, 1744, 920	<u>Mitomycin C</u> (2µg)
Mean ± Standard deviation		447.0 ± 31.2	414.3 ± 26.4	1369.7 ± 417.1	
	+	654, 542, 572	647, 573, 537		
Mean ± Standard deviation		589.3 ± 58.0	585.7 ± 56.1		

**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 15,000 mm<sup>2</sup> per Litre for each material.

**Number of Samples** 1.

**Test Comment** Not applicable.



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### CLAUSE 6.7 Extraction of Metals

**Sample Description** The sample consisted of 6 panels (two panels for each material) with dimensions 75 mm x 100 mm providing a surface area of approximately 15,000 mm<sup>2</sup> per Litre for each material. 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 and Selenium by inductively coupled plasma mass spectrometry.

Silver by graphite furnace absorption spectrophotometry (Varian).

Results	Limit of Reporting mg/L	Blank mg/L	Test 1 mg/L	Test 2 mg/L	Max Allowed mg/L
<b>Final Extract</b>					
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	0.0244	0.0239	0.7
Cadmium	0.0001	<0.0001	<0.0001	0.0001	0.002
Chromium	0.0001	<0.0001	0.0011	0.0010	0.05
Copper	0.0001	0.0003	0.0001	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	0.0002	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	0.002	<0.00003	<0.00003	<0.00003	0.1

**Evaluation** The product passed the requirements of clause 6.7 when tested at an exposure of 15,000 mm<sup>2</sup> per Litre for each material.

**Number of Samples** 1.

**Test Comment** Not applicable.



Dzung Bui  
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