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MI-15112007-LI-002191-11

APVMA Licence No:
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AS/NZS 4020:2005 Compliance Testing
Certificate of Analysis
(Supersedes all interim reporting)
Dated: 24/04/14

1. CERTIFICATE OF ANALYSIS AND SAMPLE INFORMATION:

Methodology: AS/NZS 4020, *Appendix A* and in-house method TMP-191100 & TMP-191101

AMS Report Reference No.: 1401602
Cross Reference No.: NA
Submitting Organisation: MasterMix & Packaging Ltd.
Contact: Steve Douglas
Address: 21R Bergin Road, Foxton, 4815, New Zealand
Interim Reporting: NA
Project Completion Date: 24/04/14

Product Designation: MasterMix Multi-Cote Cementitious Coating
Batch No./ Manufacturing Date: Not Provided
Product Manufacturer: MasterMix & Packaging Ltd.
21R Bergin Road, Foxton, 4815, New Zealand
Sampling Organisation: MasterMix & Packaging Ltd.
General Composition: Refer to Attachments
Product Use: In-Line
Temperature Range: (5 – 20)°C

ams Laboratory Final Report for the testing of a product to AS/NZS 4020, Products for use in contact with Drinking Water	AMS Report No.: 1401602
Submitting Organisation: MasterMix & Packaging Ltd.	
Product: MasterMix Multi-Cote Cementitious Coating	Date of Report: 24/04/14

Previous Testing: NA

Date of receipt of samples: 03/02/14

Sample selection for tests: As provided by the Submitting Organisation

Sample storage conditions: Prepared and controlled as per AS/NZS 4020, *Appendix A*

Extracts: Prepared as per AS/NZS 4020, *Appendices C, D, E, F, G & H*

Testing procedure: This Cement Coating was mixed with mains water at a mix ratio of 100:35 and poured into a mould for a minimum curing period of 3 hours. For the test, each panel had a dimension of 100mm x 78mm x 1mm and a total surface area of ~31,200mm² cement coating / 1L test water. Manufacturer's instructions were followed in preparation and curing of the test panels.

Testing is based on a 'total immersion' exposure of ~31,200mm² / L test water at (20 ± 2)°C, to cover a cold water application up to <40°C.

Refer to **Attachment A** for Product Data Sheet and **Attachment B** for Material Safety Data Sheet (MSDS).

Volume retention: NA


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2. SUMMARY OF RESULTS:

APPENDIX	RESULTS
C - TASTE	PASS at testing exposure
D - APPEARANCE	PASS at testing exposure
E - GROWTH OF AQUATIC MICRO-ORGANISMS	PASS at testing exposure
F - CYTOTOXIC ACTIVITY	PASS at testing exposure
G - MUTAGENIC ACTIVITY	PASS at testing exposure
H - EXTRACTION OF METALS	PASS at testing exposure

Based on completion and evaluation of all tests on 24/04/14, the product, **MasterMix Multi-Cote Cementitious Coating**; fully complied with the test requirements of AS/NZS 4020:2005 to cover a cold water application up to <40°C, at the recommended 'total immersion' exposure of ~31,200mm² / L test water at (20 ± 2)° C.

Testing although determined by the relevant product Standard, is generally recognised for up to 5 years by the certifying body, providing the testing procedures remain the same, and the background information on all wetted parts and the product are adequately documented. Also, the results stated in the report relate to the samples of the product submitted for testing. Any changes in the material formulation and supplier/manufacturer of all wetted items, the 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, and re-testing may be required before this actual time frame, governed by the completion and evaluation date.

Signed: 
 SANDHYA L. SINGH B. Tech, Postgrad. Dip. (Chem)
 Manager, Chemistry and Toxicology; Approved Signatory

Date: 24/04/14

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3. TASTE OF WATER EXTRACT:

Methodology: AS/NZS 4020, *Appendix C* and in-house method TMP-191130.

Exposure: 'total immersion'; ~31,200mm² / L test water

Extraction temperature: (20 ± 2)°C

Scaling factor: NA

Number of Panellists: 4

No. of samples for Chlorine-free extract: 2

No. of samples for Chlorinated extract: 2

Description	Extract	Test Water	Taste (+ / -)	Taste Description (No. of tasters)	Test Dilution *(taste intensity)
Test Blank	First 24h	Chlorine-free	-	-	-
	Final 9-day	Chlorine-free	NA	NA	NA
Sample	First 24h	Chlorine-free	-	-	-
	Final 9-day	Chlorine-free	NA	NA	NA
Test Blank	First 24h	Chlorinated	-	-	-
	Final 9-day	Chlorinated	NA	NA	NA
Sample	First 24h	Chlorinated	-	-	-
	Final 9-day	Chlorinated	NA	NA	NA

+ Taste detected - No taste detected NA Not applicable

AS/NZS 4020 test requirement: Minimum of 4 tasters with no discernible taste at the first 1/2 dilution.

Figure in brackets is the number of panellists detecting a taste at this dilution

Note:

1. Tasters are given a 14-point scale to describe its intensity, with minimum of 1 as extremely weak, and maximum of >14 as extremely strong. An average of all tasters represents taste intensity.
2. First extract becomes final extract.

EVALUATION:

On the basis of these results the samples of this product referred to in this report have complied with the test requirements of AS/NZS 4020:2005, Taste of Water Extract; *Appendix C*.

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4. APPEARANCE OF WATER EXTRACT:

Methodology: AS/NZS 4020, *Appendix D* and in-house methods TMP-191140 and TMP-191106.

Exposure: 'total immersion'; ~31,200mm² / L test water

Extraction temperature: (20 ± 2)°C

Scaling factor: NA

No. of samples tested: 2

	a) TRUE COLOUR: Hazen Units (HU)		b) TURBIDITY: Nephelometric Turbidity Units (NTU)	
	First 24h	Final 9-day	First 24h	Final 9-day
Sample Extract pH = 7.24	<2	NA	0.17	NA
Test Blank pH = 7.13	<2	NA	0.22	NA
FINAL RESULT	<2	NA	<0.01	NA
AS/NZS 4020 Test sample requirements	≤5		≤0.5	

< = less than

≤ = less than or equal to

NA Not applicable

First extract becomes final extract

For test a), test extractions were performed by AMS Laboratories Pty. Ltd. The test extracts were subsequently subcontracted to National Measurement Institute for assessment (NATA Accreditation No. 198), Report No. RN1009365.

EVALUATION:

On the basis of these results the samples of this product referred to in this report have complied with the test requirements of AS/NZS 4020:2005, Appearance of Water Extract; *Appendix D*.

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5. GROWTH OF AQUATIC MICRO-ORGANISMS:

Methodology: AS/NZS 4020, *Appendix E* and in-house method TMP-191150.

Incubation temperature: (30 ± 1)°C

Exposure: 'total immersion'

Component Name	Testing Exposure	Inoculum (mL)	* MEAN DISSOLVED OXYGEN DIFFERENCE (MDOD) in mg/L
MasterMix Multi-Cote Cementitious Coating	~31,200mm ² / 1L	100	1.29
Negative Reference Control (glass plate)	~15,000mm ² / 1L	100	<0.01
Positive Reference Control (paraffin waxed glass plate)	~15,000mm ² / 1L	100	6.93
Test Blank	Blank / 1L	100	7.13 in mg/L as mean dissolved oxygen

NA Not applicable

* Difference from test blank and represents mean of triplicate readings (weeks 5, 6, 7)
AS/NZS 4020 test sample requirements: Less than or equal to 2.4 for MDOD

EVALUATION:

On the basis of these results the samples of this product referred to in this report have complied with the test requirements of AS/NZS 4020:2005, Growth of Aquatic Micro-organisms; *Appendix E*.

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6. CYTOTOXIC ACTIVITY OF WATER EXTRACT:

Methodology: AS/NZS 4020, *Appendix F* and in-house method TMP-191160.

Exposure: 'total immersion'; ~31,200mm² / L test water

Extraction temperature: (20 ± 2)°C

Scaling factor: NA

Extracts: 24h, 48h & 72h

No. of samples tested: 2

The test sample extracts from the product, as well as the test blank (test water) were used to prepare a nutrient growth medium, subsequently utilised to grow a monkey kidney cell line (VERO ATCC CCL 81).

Microscopic Examination	Test Sample Extract (24h, 48h and 72h)	Test Blank (24h, 48h and 72h)
Cell Morphology:	Satisfactory	Satisfactory
Monolayer: Confluence/Healthy Growth as ~%	100%	100%

Cytotoxicity was detected with zinc sulphate, used as a positive control and analysed at 4µg/g, 8µg/g and 16µg/g of zinc. Water for Irrigation, Synthetic Water for Irrigation, and Phosphate Buffer Solution were included with the test blank as negative controls.

AS/NZS 4020 test sample requirements: 1) Non-cytotoxic response- confluent monolayer similar to test blank.

2) Cytotoxic response- irregularly shaped cells & cell death similar to positive controls of 8µg/g & 16µg/g zinc sulphate.

EVALUATION:

On the basis of these results the samples of this product referred to in this report have complied with the test requirements of AS/NZS 4020:2005, Cytotoxic Activity of Water Extract; *Appendix F*.

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7. MUTAGENIC ACTIVITY OF WATER EXTRACT:

Methodology: AS/NZS 4020, *Appendix G* and in-house method TMP-191170.

Exposure: 'total immersion'; ~31,200mm²/ L test water

Extraction temperature: (20 ± 2)°C

Scaling factor: NA

Extract: 24h

No. of samples tested: 2

BACTERIAL STRAIN: <i>Salmonella typhimurium</i>	* S9 -No +With	a) TRIPLICATES (REVERTANTS/PLATES) DEVIATION		b) MEAN ± STANDARD	
		TEST BLANK (Extractant Water)	SAMPLE EXTRACT (Leachate)	NEGATIVE CONTROL (Test culture only)	POSITIVE CONTROL (Standard diagnostic mutagen)
TA 98	-	a)	a)	a)	a)
		25 20 27	22 23 29	95 84 91	I 2,250 2,030 1,680
TA 98	+	b)	b)	b)	b)
		24 ± 4	25 ± 4	90 ± 6	1,987 ± 287
TA 98	-	a)	a)	a)	a)
		36 23 20	38 38 40	57 44 38	IV 820 940 840
TA 98	+	b)	b)	b)	b)
		26 ± 9	39 ± 1	46 ± 10	867 ± 64
TA 100	-	a)	a)	a)	a)
		233 208 204	275 283 280	347 323 354	II 26,080 24,600 18,670
TA 100	+	b)	b)	b)	b)
		215 ± 16	279 ± 4	341 ± 16	23,117 ± 3,921

* Metabolic Activator

II = sodium azide

NA = Not applicable

III = Benzo(a)pyrene

> = greater than

IV = 2-aminoanthracene

I = 2, 4-dinitrophenylhydrazine

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BACTERIAL STRAIN: <i>Salmonella typhimurium</i>	* S9 -No +With	a) TRIPLICATES (REVERTANTS/PLATES)		b) MEAN ± STANDARD DEVIATION	
		TEST BLANK (Extractant Water)	SAMPLE EXTRACT (Leachate)	NEGATIVE CONTROL (Test culture only)	POSITIVE CONTROL (Standard diagnostic mutagen)
TA 100	+	a)	a)	a)	a)
		296 274 290	288 312 289	519 548 638	III 3,100 3,040 2,880
		b)	b)	b)	b)
		287 ± 11	296 ± 14	568 ± 62	3,007 ± 114
TA 102	-	a)	a)	a)	a)
		836 913 871	895 895 253	889 916 871	I 7,810 8,840 9,740
		b)	b)	b)	b)
		873 ± 39	681 ± 371	892 ± 23	8,797 ± 966
TA 102	+	a)	a)	a)	a)
		1,013 1,068 1,080	873 1,111 1,145	1,042 906 889	IV 10,420 10,710 11,490
		b)	b)	b)	b)
		1,054 ± 36	1,043 ± 148	946 ± 84	10,873 ± 553

* Metabolic Activator

NA = Not applicable

> = greater than

I = 2, 4-dinitrophenylhydrazine

II = sodium azide

III = Benzo(a)pyrene

IV = 2-aminoanthracene

AS/NZS 4020 test sample requirements: (The differences in the mean number of revertants between either of the negative controls and test sample extracts should not exceed two standard deviations (for triplicate analysis)).

Positive response: If mean revertants for sample extract outside the range of spontaneous revertants for test strain.

EVALUATION:

On the basis of these results the samples of this product referred to in this report have complied with the test requirements of AS/NZS 4020:2005, Mutagenic Activity of Water Extract; *Appendix G*.

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8. EXTRACTION OF METALS:

Methodology: AS/NZS 4020, *Appendix H* and in-house methods TMP-191180 and TMP-191230.

Exposure: 'total immersion'; ~31,200mm²/ L test water

Extraction temperature: (20 ± 2)°C

Scaling factor: NA

Extract: 24h

No. of samples for I: 2

No. of samples for II: 2

Element	In-House Method	AS/NZS 4020: Maximum Allowable Concentration mg/L (ppm)	Limit of Reporting mg/L (ppm)	Test Blank mg/L (ppm)	Sample Extract I mg/L (ppm)	Sample Extract II mg/L (ppm)	FINAL RESULT I mg/L (ppm)	FINAL RESULT II mg/L (ppm)
antimony ¹ (Sb)	NT2_47	0.003	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
arsenic ² (As)	NT247_251	0.007	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
barium ¹ (Ba)	NT2_47	0.7	0.001	<0.001	0.010	0.010	0.010	0.010
cadmium ¹ (Cd)	NT2_47	0.002	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
chromium ¹ (Cr)	NT2_47	0.05	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
copper ¹ (Cu)	NT2_47	2	0.001	0.002	<0.001	<0.001	<0.001	<0.001
lead ¹ (Pb)	NT2_47	0.01	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
mercury ³ (Hg)	NT2_47_244	0.001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
molybdenum ¹ (Mo)	NT2_47	0.05	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
nickel ¹ (Ni)	NT2_47	0.02	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
selenium ² (Se)	NT247_251	0.01	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
silver ¹ (Ag)	NT2_47	0.1	0.001	<0.001	<0.001	<0.001	<0.001	<0.001

< = less than mg/L = milligram per litre ¹ = ICPMS ² = ICPMS (hydride generation) ³ = CVAAS
First extract becomes final extract.

Test extractions were performed by AMS Laboratories Pty. Ltd. The test extracts were subsequently subcontracted to National Measurement Institute for assessment (NATA Accreditation No. 198), Report No. RN1009408.

EVALUATION:

On the basis of these results the samples of this product referred to in this report have complied with the test requirements of AS/NZS 4020:2005, Extraction of Metals; *Appendix H*.