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AS/NZS 4020:2005 Compliance Testing
Certificate of Analysis
(Supersedes all interim reporting)
Dated: 22/06/07

CLIENT: Sika Australia Pty. Ltd.
55 Elizabeth Street,
Wetherill Park, NSW, 2164

OUR REF: 0701146

ATTN: Rohanthi De Silva

ORDER NO: Not Provided

INTERIM REPORTING: 13/04/07
(email)

DATE RECEIVED: 02/02/07

DATE COMMENCED: 15/02/07

DATE COMPLETED: 05/04/07

1. SAMPLES FOR TESTING:

* **Description:** **Sikaflex 11FC – Polyurethane Sealant**
Batch No. 683033

Note:

This polyurethane sealant was coated onto 1 side of a sandblasted glass plate ~1mm thickness, providing a total surface area of ~11,623mm² of test material. Manufacturer's instructions were followed in preparation and curing of the test plate. A curing temperature of ~26°C, relative humidity of ~58% and minimum curing period of 7 days were achieved during sample preparation, prior to onset of test extract ion.

Refer to **Attachments A & B**

* **Product Use:** Used as an elastic adhesive - Refer to **Attachment A**

- * **General Composition:** Polyurethane
(including type of wetted materials and supplier/manufacturers)
- * **Trade Name and Reference of Product:** Sikaflex 11FC – Polyurethane Sealant
- * **Product Manufacturer:** Sika Japan.
- * **Place of Manufacture:** Japan
- * **Submitting Organisation:** Sika Australia Pty. Ltd.
- * **Previous testing:** AS/NZS 4020:1999

* Based on product submission information supplied by client.

2. **TESTS REQUIRED:**

- Taste of Water Extract, *Appendix C*
- Appearance of Water Extract, *Appendix D*
- Growth of Aquatic Micro-organisms, *Appendix E*
- Cytotoxic Activity of Water Extract, *Appendix F*
- Mutagenic Activity of Water Extract, *Appendix G*
- Extraction of Metals, *Appendix H*

Method: TM 170

Reference: AS/NZS 4020:2005, Testing of products for use in contact with drinking water

3. TASTE OF WATER EXTRACT:

Extraction temperature: (20 ± 2)°C

Exposure: 'total immersion'; ~11,623mm² coated test panel/L test water

No. of samples tested: 2 x coated test panel:
1 for chlorine-free test extract & 1 for chlorinated test extract

Following test extractions, the final 9-day test extracts were used to prepare half dilutions: 1/8, 1/4, 1/2.

TEST EXTRACT	TEST WATER TYPE	NO. OF TASTERS	TASTE +/-	TASTE DESCRIPTION (No. of tasters)	TEST DILUTION *(taste intensity)
TEST BLANK Final 9-day:	Chlorine-free	6	-	NA	NA
SAMPLE EXTRACT Final 9-day:	Chlorine-free	6	-	NA	NA
TEST BLANK Final 9-day:	Chlorinated	6	-	NA	NA
SAMPLE EXTRACT Final 9-day:	Chlorinated	6	-	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.

Note: * 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.

COMMENTS:

On the basis of these results, the product complies with test requirements of AS/NZS 4020:2005, Taste of Water Extract; *Appendix C*, at a 'total immersion' exposure of ~11,623mm²/L test water.

4. APPEARANCE OF WATER EXTRACT

Extraction temperature: $(20 \pm 2)^{\circ}\text{C}$

Exposure: 'total immersion'; $\sim 11,623\text{mm}^2$ coated test panel/L test water

No. of samples tested: 2 x coated test panel (designated I & II)

Following test extractions, a composite test extract (1:1 by volume of duplicate samples, designated I & II) was prepared & used for assaying. The results obtained for the first 24h composite test extract are given below:

	a) TRUE COLOUR: Hazen Units (HU)	b) TURBIDITY: Nephelometric Turbidity Units (NTU)
	First 24h Extract	First 24h Extract
Sample Extract pH = 7.49	<2	0.08
Test Blank pH = 7.47	<2	0.06
FINAL RESULT	<2	0.02
AS/NZS 4020 Test sample requirements	≤ 5	≤ 0.5

< = less than

\leq = less than or equal to

For test a), test extractions were performed by AMS Laboratories Pty. Ltd. The test extracts were subsequently subcontracted to accredited National Measurement Institute for assessment, Report No. RN600673.

COMMENTS:

On the basis of these results, the product complies with the test requirements of AS/NZS 4020:2005, Appearance of Water Extract; *Appendix D*, at a 'total immersion' exposure of $\sim 11,623\text{mm}^2/\text{L}$ test water.

5. GROWTH OF AQUATIC MICRO-ORGANISMS

Incubation temperature: (30 ± 1)°C

Exposure: 'total immersion'; ~11,623mm² coated test panel/L test water

No. of samples tested: 1 x coated test panel / L

Inoculum: 100mL

Jar Size: Calibrated for 1L

GLASS JAR	* MEAN DISSOLVED OXYGEN DIFFERENCE (MDOD) in mg/L
TEST PRODUCT (Sample)	3.30
NEGATIVE REFERENCE CONTROL (~20,750mm ² glass plate)	0.02
POSITIVE REFERENCE CONTROL (~10,375mm ² paraffin waxed glass plate)	5.23
TEST BLANK	7.12 in mg/L as mean dissolved oxygen

* 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

COMMENTS:

On the basis of these results, the product complies with the test requirements of AS/NZS 4020:2005 Growth of Aquatic Micro-organisms; *Appendix E*, at a 'total immersion' exposure of ~8,453mm²/L test water.

6. CYTOTOXIC ACTIVITY OF WATER EXTRACT

Extraction temperature: $(20 \pm 2)^{\circ}\text{C}$

Exposure: 'total immersion'; $\sim 11,623\text{mm}^2$ coated test panel/L test water

No. of samples tested: 1 x coated test panel

The test extracts, 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 $4\ \mu\text{g/g}$, $8\ \mu\text{g/g}$ and $16\ \mu\text{g/g}$ of zinc. Distilled water, synthetic test water and tap water were included with the test blank as negative controls.

COMMENTS:

On the basis of these results, the test extracts of this product have shown a non-cytotoxic response, and the product therefore complies with the test requirements of AS/NZS 4020: 2005, Cytotoxic Activity of Water Extract; *Appendix F*, at a 'total immersion' exposure of $\sim 11,623\text{mm}^2/\text{L}$ test water.

7. MUTAGENIC ACTIVITY OF WATER EXTRACT

Extraction temperature: (20 ± 2)°C
 Exposure: 'total immersion'; ~11,623mm² coated test panel/L test water
 No. of samples tested: 1 x coated test panel

The results for the first 24h test extract are given below:

BACTERIAL STRAIN:	* S9	a) TRIPPLICATES (REVERTANTS/PLATES) b) MEAN + STANDARD DEVIATION			
		TEST BLANK (Extractant Water)	SAMPLE EXTRACT (Leachate)	Negative Control (Test culture only)	Positive Control (Standard diagnostic mutagen)
<i>Salmonella typhimurium</i>	-No				
	+With				
TA 98	-	a)	a)	a)	a)
		23 21 22	22 24 27	27 22 24	I 1,216 768 1,728
		b)	b)	b)	b)
		22 ± 1	24 ± 3	24 ± 3	1,237 ± 480
TA 98	+	a)	a)	a)	a)
		33 25 35	24 29 33	32 44 25	IV 4,048 4,624 5,088
		b)	b)	b)	b)
		31 ± 5	29 ± 5	34 ± 10	4,587 ± 521
TA 100	-	a)	a)	a)	a)
		116 120 128	148 136 156	132 136 180	II 4,032 2,752 3,520
		b)	b)	b)	b)
		121 ± 6	147 ± 10	149 ± 27	3,435 ± 644

* Metabolic Activator
 II = sodium azide

NA=Not applicable
 III = Benzo(a)pyrene

>=greater than
 IV = 2-aminoanthracene

I 2, 4-dinitrophenylhydrazine

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) 192 176 280	a) 184 176 208	a) 224 280 272	a) III 1,536 1,504 1,216
		b) 216 ± 56	b) 189 ± 17	b) 259 ± 30	b) 1,419 ± 176
TA 102	-	a) 408 440 416	a) 440 416 424	a) 400 416 448	a) I 768 896 768
		b) 421 ± 17	b) 427 ± 12	b) 421 ± 24	b) 811 ± 74
TA 102	+	a) 424 392 432	a) 408 440 456	a) 464 408 416	a) IV 592 688 576
		b) 416 ± 21	b) 435 ± 24	b) 429 ± 30	b) 619 ± 61

* Metabolic Activator

NA=Not applicable

I 2, 4-dinitrophenylhydrazine

II = sodium azide

III = Benzo(a)pyrene

IV = 2-aminoanthracene

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

COMMENTS :

On the basis of these results, the test extract has shown a non-mutagenic response and the product therefore meets the test requirements of AS/NZS 4020: 2005, Mutagenic Activity of Water Extract; Appendix G, at a 'total immersion' exposure of ~11,623mm²/L test water.

8. EXTRACTION OF METALS

Extraction temperature: (20 ± 2)°C

Exposure: 'total immersion'; ~11,623mm² coated test panel/L test water

No. of samples tested: 2 x coated test panel (designated I & II)

Following test extractions, a composite test extract (1:1 by volume of duplicate samples, designated I & II) was prepared and used for assaying.

The results obtained for the first 24h composite test extract are given below:

Element	Unit (mg/L)	Detection Limit	Maximum Allowable Concentration	Sample Extract	Test Blank	FINAL RESULT
antimony (Sb)	mg/L	0.001	0.003	<0.001	<0.001	<0.001
arsenic (As)	mg/L	0.001	0.007	<0.001	<0.001	<0.001
barium (Ba)	mg/L	0.001	0.7	<0.001	<0.001	<0.001
cadmium (Cd)	mg/L	0.001	0.002	<0.0001	<0.0001	<0.0001
chromium (Cr)	mg/L	0.001	0.05	0.001	0.0013	<0.001
copper (Cu)	mg/L	0.001	2	<0.001	<0.001	<0.001
lead (Pb)	mg/L	0.001	0.01	<0.001	<0.001	<0.001
mercury (Hg)	mg/L	0.0001	0.001	<0.0001	<0.0001	<0.0001
molybdenum (Mo)	mg/L	0.001	0.05	<0.001	<0.001	<0.001
nickel (Ni)	mg/L	0.001	0.02	<0.001	<0.001	<0.001
selenium (Se)	mg/L	0.001	0.01	<0.001	<0.001	<0.001
silver (Ag)	mg/L	0.001	0.1	<0.001	<0.001	<0.001

< = less than

mg/L = milligram per Litre

Test extractions were performed by AMS Laboratories Pty. Ltd. The test extracts were subsequently subcontracted to accredited National Measurement Institute for assessment, Report No. RN600674.

COMMENTS:

On the basis of these results, the product complies with the test requirements of AS/NZS 4020:2005, Extraction of Metals; *Appendix H*, at a 'total immersion' exposure of ~11,623mm²/L test water.

9. SUMMARY : Sikaflex 11FC – Polyurethane Sealant

AS/NZS 4020:2005 TESTS	RESULTS
a) TASTE - <i>Appendix C</i>	PASS at a 'total immersion' exposure of ~11,623mm ² /L test water.
b) APPEARANCE - <i>Appendix D</i> i) Colour ii) Turbidity	i) PASS at a 'total immersion' exposure of ~11,623mm ² /L test water. ii) PASS at a 'total immersion' exposure of ~11,623mm ² /L test water.
c) GROWTH OF AQUATIC MICRO-ORGANISMS - <i>Appendix E</i>	PASS at a 'total immersion' exposure of ~8,453mm ² /L test water.
d) CYTOTOXIC ACTIVITY - <i>Appendix F</i>	PASS at a 'total immersion' exposure of ~11,623mm ² /L test water.
e) MUTAGENIC ACTIVITY - <i>Appendix G</i>	PASS at a 'total immersion' exposure of ~11,623mm ² /L test water.
f) EXTRACTION OF METALS - <i>Appendix H</i>	PASS at a 'total immersion' exposure of ~11,623mm ² /L test water.

Note: All tests are based on a cold application up to <40°C with testing at a 'total immersion' exposure of ~11,623mm²/L test water at (20 ± 2)°C, except Test c). Test c) Growth of Aquatic Micro-organisms, the recommended (30 ± 1)°C was employed.

10. CONCLUSIONS

The product, **Sikaflex 11FC – Polyurethane Sealant**, referred to in this report, has been tested in accordance to AS/NZS 4020:2005, Testing of products for use in contact with drinking water for:

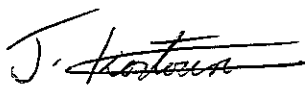
- Taste of Water Extract, *Appendix C*
- Appearance of Water Extract, *Appendix D*
- Growth of Aquatic Micro-organisms, *Appendix E*
- Cytotoxic Activity of Water Extract, *Appendix F*
- Mutagenic Activity of Water Extract, *Appendix G*
- Extraction of Metals, *Appendix H*

Based on all testing completed and evaluated on **05/04/07**, the product, **Sikaflex 11FC-Polyurethane Sealant; Batch No. 683033**, **fully complies with the test requirements of AS/NZS 4020:2005, to cover a cold water application up to <40°C, at a ‘total immersion’ exposure of ~8,453mm²/L test water.**

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 the product is 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 ingredients, 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 date.

Our reports are recognised by regulatory bodies such as SAI Global Assurance Services, qualified for product certification to AS/NZS 4020 compliance testing, as well as for the purpose of WELS registration by WELS Product Registrations, Standards and Compliance.

Signed: _____



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Analytical Product Testing Assistant; Approved Signatory