

TEST REPORT



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TEST SUMMARY

Objective

Assessment of Supplied Sample to AS4654.1-2012

Project

Evaluation of ACTFLEX 101 UV to AS4654.1-2012

Report Number

254-1 AS4654.1-2012

Customer

NAME	FORSPEC Protective
ADDRESS	Coatings 22/872 Canterbury Road, Roselands 2196 NSW
CONTACT PERSON	James Gilto
EMAIL	admin@actechpc.com.au
MOBLIE	0424424178

Name of test material

ACTFLEX 101 UV

Description of test material

ACRYLIC UV RESISTANT POLYUREHTANE MEMBRANE

Date of receipt of test material

31/07/2023

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Testing Facility and Location

NAME	XTec Gen Pty Ltd
ADDRESS	30-32 Park Avenue Woodville North 5012
ABN	22634729294

LIMITATION

The test results reported here relate only to the items tested.

CUSTOMER SUPPLIED INFORMATION & DATA

Number of coats: 2 coats at 0.925mm WFT per coat

Expected Dry Film thickness: 1.2mm 1200-micron finish coat.

Dried film supplied.

TERMS AND CONDITIONS

This report is issued in accordance with the Terms and Conditions as detailed and agreed in the *XTecGen Test Request and Sample Submission Form*.

SIGNATORIES

Author

Michael Bakanyozo

Head Laboratory Technician

Reviewer

Eric Scardigno

Laboratory Manager

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SUMMARY OF TESTS

AS4654.1 Requirements:

PROPERTY	METHOD	RESULT	ASSESSMENT CRITERIA	ASSESSMENT
Abrasion Resistance: Non-Trafficable	AS 1580.403.2	0.071mm	AS 4654.1 Paragraph 2.3	Meets requirement for non-trafficable membrane
Abrasion Resistance: Trafficable	AS 1580.403.2	0.156mm	AS 4654.1 Paragraph 2.3	Meets requirement for pedestrian traffic only
Bond Strength	ASTM C794	29.02N	State result	
Acceptance of Cyclic movement	AS 4654.1 Appendix B	Failure not observed	AS 4654.1 Appendix B, Paragraph B4	PASS
Durability: Control Elongation at Break	AS1145.3	434 %	AS 4654.1 Appendix A, Table A1	CLASS III
Durability: Control Tensile Strength		4.26 MPa	State result	
Durability: Water Immersion Elongation at Break	AS 4654.1 Appendix A	596%	AS 4654.1 Appendix A, Table A4	PASS
Durability: Water Immersion Tensile Strength		1.52 MPa	State result	
Durability: Detergent Immersion Elongation at Break		706 %	AS 4654.1 Appendix A, Table A4	PASS
Durability: Detergent Immersion Tensile Strength		2.83 MPa	State result	
Durability: Heat Aging Elongation at Break	N/A	338 %	AS 4654.1, Table A4	PASS
Durability: Heat Aging Tensile Strength		3.51 MPa	State result	

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Durability: Ultraviolet Resistance Elongation at Break	UV Lamp	317 %	AS 4654.1 Appendix A, Table A4	PASS
Durability: Ultraviolet Resistance Tensile Strength		2.73 MPa	State result	
Temperature Resistance: Water Vapour Transmission	AMTM004	3.07g/m ² /24 hours	State result	
Water Vapour Transmission	ASTM E96	3.07g/m ² /24 hours	State result	

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ABRASION RESISTANCE: NON-TRAFFICABLE

Testing

Test carried out in accordance with AS 1580.403.2.

Additions, deviations and/or exclusions from AS1580.403.2:

Determination of abrasive wear performed as per AS4654.1, Paragraph 2.3.1

Results

Date of test: 06/09/2023

PARAMETER	VALUE
Abrasion assessment method	Depth of abrasion
Depth of abrasion	0.071mm
Abrasive wheels: Model	CS-10
Panel 1 Abrasive wheels: Serial Number & Expiry Date	KX03C1 DEC 2024
Panel 2 Abrasive wheels: Serial Number & Expiry Date	KX03C1 DEC 2024
Mass applied to abrasive wheels	1000g
Model of abraser	Gester GT-C14B-2
Number of cycles per test panel	500

PANEL	READING	THICKNESS BEFORE ABRASION (mm)	THICKNESS AFTER ABRASION (mm)	LOSS OF MEMBRANE BUILD (mm)
1	1	3.286	3.250	0.036
	2	3.283	3.280	0.003
	3	3.051	3.048	0.003
2	1	3.168	3.052	0.116
	2	3.240	3.003	0.237
	3	3.338	3.309	0.029
Mean		3.228	3.157	0.071
Standard Deviation		0.135	0.126	0.091

Passing Requirement: *“When tested in accordance with AS 1580.403.2 using the CS-10 wheel with 500 cycles, for areas subjected only to maintenance access, the depth of abrasion shall be less than 0.2mm”*

Result: 0.071mm. This sample is suitable for areas subjected to only maintenance access.

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ABRASION RESISTANCE: TRAFFICABLE

Testing

Test carried out in accordance with AS 1580.403.2.

Additions, deviations and/or exclusions from AS 1580.403.2:

Determination of abrasive wear performed as per AS4654.1, Paragraph 2.3.2

Results

Date of test: 06/09/2023

PARAMETER	VALUE
Abrasion assessment method	Depth of abrasion
Depth of abrasion	0.156mm
Abrasive wheels: Model	H-22
Panel 1 Abrasive wheels: Serial Number	MG25B1
Panel 2 Abrasive wheels: Serial Number	MG25B1
Mass applied to abrasive wheels	1000g
Model of abraser	Gester GT-C14B-2
Number of cycles per test panel	1000

PANEL	READING	THICKNESS BEFORE ABRASION (mm)	THICKNESS AFTER ABRASION (mm)	LOSS OF MEMBRANE BUILD (mm)
1	1	3.531	3.261	0.270
	2	3.440	3.380	0.060
	3	3.216	3.052	0.164
2	1	3.209	3.069	0.140
	2	3.056	2.926	0.130
	3	3.075	2.906	0.169
Mean		3.255	3.099	0.156
Standard Deviation		0.162	0.166	0.068

Passing Requirement:

“Abrasion resistance for trafficable shall be as follows:

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- a) When tested in accordance with AS 1580.403.2 using the H-22 wheel with 1000 cycles, for areas subjected only to pedestrian traffic, the depth of abrasion shall be less than 0.2mm.
- b) When tested in accordance with AS1580.403.2 using the H-22 wheel with 1000 cycles, for areas subjected only to occasional service vehicle traffic, the depth of abrasion shall be less than 0.1mm.
- c) When tested in accordance with AS 1580.403.2 using the H-22 wheel with 1000 cycles, for areas subjected to regular foot traffic, the depth of abrasion shall be less than 0.05mm."

Result: The test achieved a depth of abrasion of 0.156mm This sample is suitable for only pedestrian traffic.

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BOND STRENGTH

Date of test: 28/09/2023

Testing:

Testing carried out in accordance with ASTM C794.

Additions, deviations and/or exclusions from ASTM C794:

Nil

Specimen Preparation:

PARAMETER	VALUE
Substrate	Concrete block
Substrate preparation	Wiped with damp cloth, then primed
Substrate primer	EP250
Mesh preparation	Wiped with damp cloth, then primed
Mesh primer	EP250

Test Results:

READING	PEAK PEEL FORCE (N)	MODE OF FAILURE			
		SUBSTRATE FAILURE (%)	ADHESIVE FAILURE (%)	COHESIVE FAILURE (%)	SCREEN DELAMINATION (%)
Specimen 1 Reading 1	22.38	100	0	0	0
Specimen 1 Reading 2	21.56	95	0	5	0
Specimen 1 Reading 3	40.38	80	0	10	10
Specimen 1 Reading 4	38.32	90	0	10	0
Specimen 2 Reading 1	63.33	0	0	0	100
Specimen 2 Reading 2	45.34	0	0	50	50

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Specimen 2 Reading 3	29.41	0	0	40	60
Specimen 2 Reading 4	15.68	0	0	100	0
Specimen 3 Reading 1	6.83	100	0	0	0
Specimen 3 Reading 2	22.70	100	0	0	0
Specimen 3 Reading 3	29.43	100	0	0	0
Specimen 3 Reading 4	12.93	100	0	0	0
Average	29.02				
Std Dev	15.75				

Result: 29.02N

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CYCLIC MOVEMENT

Date of test: 21/08- 25/08/2023

Testing:

Testing carried out in accordance with AS 4654.1 Appendix B “Assessment of resistance of waterproofing membranes to cyclic movement”

Additions, deviations and/or exclusions from AS 4654.1 Appendix B:

Nil

Test Parameters:

PARAMETER	VALUE
Membrane class	III
Number of cycles	50
Cycle time	2 Hours
Cycle expansion	4 mm
Sample Size	65 mm x 25 mm
Sample span	2 mm between plates
Sample thickness	1.142 mm

Test Results:

TEST RESULT	VALUE
Number of cycles completed	50
Surface crazing	Nil
Surface tears	Nil
Membrane rupture	Nil

Test Observations:

DAY	DATE	NUMBER OF CYCLES	Failure Observed		
			RUPTURE/HOLING		OTHER
1	21/08/2023	0	☐ Yes	☒ No	
2	22/08/2023	12	☐ Yes	☒ No	
3	23/08/2023	24	☐ Yes	☒ No	
4	24/08/2023	25	☐ Yes	☒ No	
5	25/08/2023	50	☐ Yes	☒ No	

Passing requirement: “Any rupture holing the specimen or extending through the thickness for more than 1mm in from the edge of the specimen shall be taken as a failure and the number of cycles to failure shall be reported. If failure does not occur after 50 cycles it shall be reported together with the

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types of any surface defects that have been induced and the number of cycles at which onset of the defect occurred”

Result: Pass. Meets the requirement for CSIRO moving joint test as per AS 4654.1 Appendix B.

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DURABILITY OF MEMBRANE

CONTROL SET

Date of test: 09/08/2023

Testing: Test carried out in accordance with AS 1145.3.

Additions, deviations and/or exclusions from AS 1145.3: Nil

Test Parameters:

PARAMETER	VALUE
Ambient temperature (conditioning)	23.9-25.7°C
Ambient humidity (conditioning)	46.2-52.2% RH
Ambient temperature (testing)	23.6°C
Ambient humidity (testing)	29.7% RH
Accuracy grading of test machine	A
Specimen type	Type 2
Elongation measurement type:	Electronic internal measurement
Method of preparation of specimens	Dry film
Orientation of specimens to direction of cast	Parallel to direction of casting blade
Clamping device:	Pneumatic jaws
Testing speed:	50mm/min

Test Results:

Replicate	Sample thickness (mm)	Maximum Extension (mm)	Tensile Strength (MPa)	Elongation at Break (%)
1	1.14	233.1	4.24	466
2	1.16	220.6	4.24	441
3	1.15	207.5	4.27	415
4	1.18	226.2	4.27	452
5	1.14	198.9	4.27	398
Mean	1.15	217.3	4.26	434
Std Deviation	0.02	13.9	0.02	28

Requirement for Class III (high extensibility): $\geq 300\%$ elongation at break

Requirement for Class II (medium extensibility) 60-299% elongation at break

Requirement for Class I (low extensibility) $< 60\%$ elongation at break.

Classification: Class III

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DURABILITY OF MEMBRANE

WATER IMMERSION

Date of test: 21/08-9/10/2023

Testing:

Test carried out in accordance with AS 4654.1 Table A4.

Additions, deviations and/or exclusions from AS 4654.1 Table A4.

Nil

Test Parameters:

PARAMETER	VALUE
Ambient temperature (conditioning)	23.9-25.7°C
Ambient humidity (conditioning)	46.2-52.2% RH
Ambient temperature (testing)	21.9-25.2°C
Ambient humidity (testing)	30.7-51.3%
Minimum accuracy grading of test machine	A
Specimen type	Type 2
Elongation measurement type:	Electronic internal measurement
Method of preparation of specimens	Dry Film
Orientation of specimens to direction of cast	Parallel to direction of casting blade
Clamping device:	Pneumatic jaws
Testing speed:	50mm/min

Test Results:

Sample Number	Sample thickness (mm)	Maximum Extension (mm)	Tensile strength (MPa)	Elongation at break (%)
1	1.27	291.8	1.30	583
2	1.28	287.3	1.32	574
3	1.26	289.7	1.34	579
7 Day Means	1.27	289.6	1.32	579
7 Day Std Devs	0.01	2.3	0.02	5
4	1.23	320.5	1.44	641
5	1.25	286.7	1.39	573
6	1.38	267.4	1.27	535
28 Day Means	1.29	291.6	1.37	583
28 Day Std Devs	0.08	26.9	0.08	54
7	1.21	300.5	1.54	601

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8	1.24	292.2	1.52	584
9	1.26	301.4	1.51	603
56 Day Means	1.24	298.0	1.52	596
56 Day Std Devs	0.03	5.1	0.02	10

Passing Requirement: *“Elongation at break shall not be less than 25% retention of elongation at break of the controls”* 58] Table 6.1. A failure is for less than 25% retention of elongation at break of the controls”.

To pass this condition an elongation at break value of 109% or greater is required.

Result: 596% PASS

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DURABILITY OF MEMBRANE

DETERGENT IMMERSION

Date of test: 21/08-9/10/2023

Testing:

Test carried out in accordance with AS 4654.1 Table A4.

Additions, deviations and/or exclusions from AS 4654.1 Table A4:

Nil

Test Parameters:

PARAMETER	VALUE
Ambient temperature (conditioning)	23.9-25.7°C
Ambient humidity (conditioning)	46.2-52.2% RH
Ambient temperature (testing)	21.9-25.2°C
Ambient humidity (testing)	30.7-51.3%
Minimum accuracy grading of test machine	A
Specimen type	Type 2
Elongation measurement type:	Electronic internal measurement
Method of preparation of specimens	Dry film
Orientation of specimens to direction of cast	Parallel to direction of casting blade
Clamping device:	Pneumatic jaws
Testing speed:	50mm/min

Test Results: Detergent Immersion

Sample Number	Sample thickness (mm)	Maximum Extension (mm)	Tensile strength (MPa)	Elongation at break (%)
1	0.87	504.0	4.19	1008
2	0.84	434.8	4.06	869
3	0.85	495.5	4.33	991
7 Day Means	0.85	478.1	4.19	956
7 Day Std Devs	0.01	37.8	0.14	76
4	0.85	472.8	3.61	945
5	0.84	481.4	3.83	963
6	0.84	469.1	3.92	938
28 Day Means	0.84	474.4	3.78	949
28 Day Std Devs	0.01	6.3	0.16	13

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7	0.90	365.7	2.64	731
8	0.88	348.1	2.94	696
9	0.89	345.2	2.90	690
56 Day Means	0.89	353.0	2.83	706
56 Day Std Devs	0.01	11.1	0.16	22

Passing Requirement: *“Elongation at break shall not be less than 25% retention of elongation at break of the controls”.*

To pass this condition an elongation at break value of 109 % or greater is required.

Result: 706% PASS

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DURABILITY OF MEMBRANE

HEAT AGING

Date of test: 04/09/2023

Testing:

Test carried out in accordance with AS 4654.1 Table A4.

Additions, deviations and/or exclusions from AS 4654.1 Table A4:

Nil

Test Parameters:

PARAMETER	VALUE
Ambient temperature (conditioning)	23.9-25.7°C
Ambient humidity (conditioning)	46.2-52.2% RH
Ambient temperature (testing)	22.0°C
Ambient humidity (testing)	44.1% RH
Accuracy grading of test machine	A
Specimen type	Type 2
Elongation measurement type:	Electronic internal measurement
Method of preparation of specimens	Dry film
Orientation of specimens to direction of cast	Parallel to direction of casting blade
Clamping device:	Pneumatic jaws
Testing speed:	50mm/min

Test Results:

Number of replicates	Sample thickness (mm)	Maximum Extension (mm)	Tensile strength (MPa)	Elongation at break (%)
1	1.15	194.9	3.63	390
2	1.15	113.2	3.39	226
3	1.16	199.8	3.50	399
Mean	1.15	169.3	3.51	338
Std Deviation	0.01	48.7	0.12	97

Passing Requirement: "Elongation at break shall be not less than 50% of the result recorded for the controls".

To pass this condition an elongation at break value of 218% or greater is required.

Result: 338% PASS

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DURABILITY OF MEMBRANE

ULTRAVIOLET EXPOSURE

Date of test: 30/10/2023

Testing:

Test carried out in accordance with AS 4654.1 Table A4, Appendix A.

Additions, deviations and/or exclusions from AS 4654.1 Table A4, Appendix A:

Nil

Test Parameters:

PARAMETER	VALUE
Ambient temperature (conditioning)	23.9-25.7°C
Ambient humidity (conditioning)	46.2-52.2% RH
Ambient temperature (testing)	22.2°C
Ambient humidity (testing)	43.6% RH
Accuracy grading of test machine	A
Specimen type	Type 2
Elongation measurement type:	Electronic internal measurement
Method of preparation of specimens	Dry film
Orientation of specimens to direction of cast	Parallel to direction of casting blade
Clamping device:	Pneumatic jaws
Testing speed:	50mm/min

Test Results:

Number of replicates	Sample thickness (mm)	Maximum Extension (mm)	Tensile strength (MPa)	Elongation at break (%)
1	1.22	150.3	2.81	301
2	1.22	161.5	2.67	323
3	1.21	163.3	2.72	327
Mean	1.22	158.4	2.73	317
Std Deviation	0.01	7.0	0.07	14

Passing Requirement: "Elongation at break shall be not less than 40% of the result recorded for the controls".

To pass this condition an elongation at break value of 174% or greater is required.

Result: 317% PASS

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TEMPERATURE RESISTANCE

Date of test: 11/09-25/09-2023

Testing:

Test carried out in accordance with AMTM004.

Additions, deviations and/or exclusions from AMTM004:

Nil

Test Parameters:

PARAMETER	VALUE
Cold exposure: Immersion date	04/09/2023
Cold exposure: Removal date	06/09/2023
Cold exposure: Temperature range	-15 - -17°C
Heat exposure: Immersion date	06/09/2023
Heat exposure: Removal date	08/09/2023
Heat exposure: temperature range	85°C
WVT: Date of test	11/09-25/09-2023
WVT: Test temperature	22.8-24.4°C
WVT: Test humidity	48.3-53.4% RH
WVT: Cup design	Round, anodised aluminium cup with threaded sealing ring and gasket
WVT: Cup sealant	Sealing ring and gasket
WVT: Desiccant	Anhydrous Calcium Chloride

Test Results- Temperature Resistance

SAMPLE	THICKNESS (mm)	SIDE OF SPECIMEN HIGHER VAPOUR PRESSURE WAS APPLIED TO	REGRESSION		WATER VAPOUR TRANSMISSION RATE (g/m ² /24 hours)
			EQUATION	r ² VALUE	
1	1.13	Side A, top of cast film	Mass _(g) = 0.0004x(Time _{hr})+168.11	0.9954	2.88
2	1.11	Side A, top of cast film	Mass _(g) = 0.0005x(Time _{hr})+167.54	0.9979	3.62

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3	1.13	Side B, bottom of cast film	$\text{Mass}_{(g)} = 0.0004 \times (\text{Time}_{\text{hr}}) + 192.39$	0.9966	2.89
4	1.12	Side B, bottom of cast film	$\text{Mass}_{(g)} = 0.0004 \times (\text{Time}_{\text{hr}}) + 171.11$	0.9977	2.89
Mean					3.07
Std Deviation					0.37

Result: 3.07g/m²/24 hours. PASS

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WATER VAPOUR TRANSMISSION RATE

Date of test: 28/08-11/09/2023

Testing:

Test carried out in accordance with ASTM E96 Desiccant Method.

Additions, deviations and/or exclusions from ASTM E96 Desiccant Method:

Nil

Test Parameters:

PARAMETER	VALUE
Test temperature:	22.8-24.8°C
Test humidity:	44.4-51.3% RH
Cup design:	Round, anodised aluminium cup with threaded sealing ring and gasket
Sealant:	Sealing ring and gasket
Desiccant:	Anhydrous Calcium Chloride

Test Results

SAMPLE	THICKNESS (mm)	SIDE OF SPECIMEN HIGHER VAPOUR PRESSURE WAS APPLIED TO	REGRESSION		WATER VAPOUR TRANSMIS SION RATE (g/m ² /24 hours)
			EQUATION	r ² VALUE	
1	1.08	Side A, top of cast film	Mass _(g) =0.0006x (Time _{hr})+ 130.48	0.9986	4.32
2	1.11	Side A, top of cast film	Mass _(g) = 0.0004x(Time _{hr})+136.58	0.9987	2.89
3	1.09	Side B, bottom of cast film	Mass _(g) = 0.0003x(Time _{hr})+131.08	0.9991	2.17
4	1.07	Side B, bottom of cast film	Mass _(g) = 0.0004x(Time _{hr})+131.85	0.9953	2.89
Mean	1.08				3.07
Std Deviation	0.02				0.90

Result: 3.07g/m²/24 hours. PASS

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Report number
254-1 AS 4654.1-2012

Issue Date
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Expiry Date
08/11/2026

TEST REPORT



Accredited for compliance with ISO/IEC 17025 – Testing
20678

END OF REPORT

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