TEST REPORT

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TEST SUMMARY

Objective

Assessment of Supplied Sample AS 4654.1-2012

Project

Assessment of *ACTFLEX 906 WPU* to AS/NZS 4858:2004

Report Number

251-3 AS 4654.1-2012

Customer

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

Name of test material

ACTFLEX 906 WPU

Description of test material

Water based polyurethane

Date of receipt of test material

18/07/2023

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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

2 Coats @ 0.9mm expected dry film thickness 1.2mm

Dry 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
Bond Strength	*ASTM C794*	*30.37N*	*State result*	
Acceptance of Cyclic movement	*AS 4654.1 Appendix B*	*No failure observed*	*AS 4654.1 Appendix B, Paragraph B4*	PASS
Durability: Control Elongation at Break	*AS1145.3*	*518 %*	*AS 4654.1 Appendix A, Table A1*	CLASS III
Durability: Control Tensile Strength		*3.54 MPa*	*State result*	
Durability: Water Immersion Elongation at Break	*AS 4654.1 Appendix A*	*561 %*	*AS 4654.1 Appendix A, Table A4*	PASS
Durability: Water Immersion Tensile Strength		*1.10 MPa*	*State result*	
Durability: Detergent Immersion Elongation at Break		*341 %*	*AS 4654.1 Appendix A, Table A4*	PASS
Durability: Detergent Immersion Tensile Strength		*0.99 MPa*	*State result*	
Durability: Heat Aging Elongation at Break	*N/A*	*739 %*	*AS 4654.1 Appendix A, Table A4*	PASS
Durability: Heat Aging Tensile Strength		*4.30 MPa*	*State result*	
Temperature Resistance	*AMTM004*	*5.05g/m^2/24 hours*	*State result*	
Water Vapour Transmission	*ASTM E96*	*7.76g/m^2/24 hours*	*State result*	

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BOND STRENGTH

Date of test: 18/09/2023

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	N/A
Mesh primer	N/A

Test Results:

READING	PEAK PEEL FORCE (N)	MODE OF FAILURE			
		SUBSTRATE FAILURE (%)	ADHESIVE FAILURE (%)	COHESIVE FAILURE (%)	SCREEN DELAMINATION (%)
Specimen 1 Reading 1	27.96	100	0	0	0
Specimen 1 Reading 2	24.46	100	0	0	0
Specimen 1 Reading 3	39.54	90	0	10	0
Specimen 1 Reading 4	45.05	90	0	10	0
Specimen 2 Reading 1	14.82	100	0	0	0

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Specimen 2 Reading 2	35.37	90	0	10	0
Specimen 2 Reading 3	79.22	90	0	10	0
Specimen 2 Reading 4	13.90	100	0	0	0
Specimen 3 Reading 1	16.58	100	0	0	0
Specimen 3 Reading 2	28.76	95	0	5	0
Specimen 3 Reading 3	13.79	95	0	5	0
Specimen 3 Reading 4	25.00	95	0	5	0
Average	30.37				
Std Dev	18.49				

Result: 30.37N

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CYCLIC MOVEMENT

Date of test: 31/07-04/08/2023

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	1.288

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	31/07	0	☐Yes	☒No	
2	1/08	13	☐Yes	☒No	
3	2/08	25	☐Yes	☒No	
4	3/08	37	☐Yes	☒No	
5	4/08	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: 26/07/2023

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)	24.0-25.8°C
Ambient humidity (conditioning)	47.3-49.0% RH
Ambient temperature (testing)	25.4°C
Ambient humidity (testing)	30.9% 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	1.20	225.0	3.53	450
2	1.20	265.7	3.50	531
3	1.19	217.9	3.53	436
4	1.16	308.4	3.57	617
5	1.23	277.5	3.59	555
Mean	1.19	258.9	3.54	518
Std Deviation	0.02	37.7	0.04	75

Requirement for Class III (high extensibility): ≥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: 17/08-5/10/2023

Testing:

Test carried out in accordance with AS 4654.1 Appendix A.

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

Nil

Test Parameters:

PARAMETER	VALUE
Ambient temperature (conditioning)	24.0-25.8°C
Ambient humidity (conditioning)	47.3-49.0% RH
Ambient temperature (testing)	21.9-25.4°C
Ambient humidity (testing)	47.3-49.0% RH
Minimum accuracy grading of test machine	A
Specimen type	Type 5
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	1.26	222.1	1.24	444
2	1.29	195.3	1.15	390
3	1.25	228.2	1.17	456
7 Day Means	1.27	215.2	1.19	430
7 Day Std Devs	0.02	17.5	0.05	35
4	1.59	238.4	0.93	477
5	1.38	299.3	1.11	598
6	1.38	295.1	1.12	590
28 Day Means	1.45	277.6	1.06	555
28 Day Std Devs	0.12	34.0	0.11	68
7	1.36	337.1	1.12	674

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8	1.38	246.7	1.08	493
9	1.36	258.2	1.09	516
56 Day Means	1.37	280.7	1.10	561
56 Day Std Devs	0.01	49.2	0.02	98

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 130% or greater is required.

Result: 561% PASS

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DURABILITY OF MEMBRANE

DETERGENT IMMERSION

Date of test: 17/08-5/10/2023

Testing:

Test carried out in accordance with AS 4654.1 Appendix A.

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

Nil

Test Parameters:

PARAMETER	VALUE
Ambient temperature (conditioning)	24.0-25.8°C
Ambient humidity (conditioning)	47.3-49.0% RH
Ambient temperature (testing)	21.9-25.4°C
Ambient humidity (testing)	47.3-49.0% RH
Minimum accuracy grading of test machine	A
Specimen type	Type 5
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	1.38	145.8	1.02	291
2	1.37	150.2	1.04	300
3	1.37	198.9	1.06	398
7 Day Means	1.37	165.0	1.04	330
7 Day Std Devs	0.01	29.5	0.02	59
4	1.32	144.1	1.05	288
5	1.36	170.9	1.04	342
6	1.34	158.2	1.06	316
28 Day Means	1.34	157.7	1.05	315
28 Day Std Devs	0.02	13.4	0.01	27
7	1.39	159.4	0.99	319

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8	1.35	182.4	1.01	365
9	1.41	169.1	0.98	339
56 Day Means	1.39	170.3	0.99	341
56 Day Std Devs	0.03	11.5	0.01	23

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 130% or greater is required.

Result: 341% PASS

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DURABILITY OF MEMBRANE

HEAT AGING

Date of test: 01/09/2023

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)	24.0-25.8°C
Ambient humidity (conditioning)	47.3-49.0% RH
Ambient temperature (testing)	22.7°C
Ambient humidity (testing)	42.5% 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	1.26	374.9	4.45	750
2	1.16	388.9	4.27	778
3	1.25	345.6	4.17	691
Mean	1.22	369.8	4.30	739
Std Deviation	0.06	22.1	0.14	44

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 259% or greater is required.

Result: 739% PASS

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TEMPERATURE RESISTANCE

Date of test: 14-28/08/2023

Testing:

Test carried out in accordance with AS 4654.1 Clause 2.6.

Additions, deviations and/or exclusions from with AS 4654.1 Clause 2.6.

WVT rate carried out in accordance with ASTM E96 Desiccant Method after exposure.

Test Parameters:

PARAMETER	VALUE
Cold exposure: Immersion date	7/08/2023 09:00Hrs
Cold exposure: Removal date	9/08/2023 09:00Hrs
Cold exposure: Temperature range	-15.2 - -16.2°C
Heat exposure: Immersion date	9/08/2023 10:00Hrs
Heat exposure: Removal date	11/08/2023 10:00Hrs
Heat exposure: temperature range	85°C
WVT: Date of test	14-28/08/2023
WVT: Test temperature	23.6-25.4°C
WVT: Test humidity	45.4-51.6% 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 TRANSMISSON RATE ($g/m^2/24$ hours)
			EQUATION	r^2 VALUE	
1	1.34	Side A, top of cast film	$Mass_{(g)}$= 0.0008x($Time_{hr}$)+171.27	0.9998	5.77
2	1.38	Side A, top of cast film	$Mass_{(g)}$= 0.0007x($Time_{hr}$)+167.47	0.9998	5.04

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3	1.33	Side B, bottom of cast film	$Mass_{(g)}$= 0.0006x($Time_{hr}$)+168.93	0.9998	4.33
4	1.31	Side B, bottom of cast film	$Mass_{(g)}$= 0.0007x($Time_{hr}$)+194.94	0.9997	5.06
Mean					5.05
Std Deviation					0.59

Result: 5.05g/m^2/24 hours.

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WATER VAPOUR TRANSMISSION RATE

Date of test: 13/09-27/09/2023

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:	21.9-24.6°C
Test humidity:	35.0-45.5% RH
Cup design:	Round cup with sealing flange
Sealant:	Paraffin Wax
Desiccant:	Anhydrous Calcium Chloride

Test Results

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	1.31	Side A, top of cast film	$Mass_{(g)}=0.0012x(Time_{hr})+193.44$	0.9996	8.67
2	1.25	Side B, bottom of cast film	$Mass_{(g)}=0.0014x(Time_{hr})+169.22$	0.9997	10.09
3	1.35	Side A, top of cast film	$Mass_{(g)}=0.0008x(Time_{hr})+166.32$	0.9993	5.76
4	1.33	Side B, bottom of cast film	$Mass_{(g)}=0.0009x(Time_{hr})+194.93$	0.9993	6.51
Mean	1.31				7.76
Std Deviation	0.04				1.99

Result: 7.76g/m²/24 hours.

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Report number	Issue Date	Expiry Date
251-3 AS 4654.1-2012	27/10/2023	27/10/2026

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END OF REPORT

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