TEST REPORT

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TEST SUMMARY

Objective

Assessment of ACTFLEX 929 HV AS 4654.1-2012

Project

Assessment of *ACTFLEX 929 HV* to AS/NZS 4858:2004

Report Number

242-7 AS 4654.1-2012

Customer

NAME	FORSPEC Protective Coatings
ADDRESS	22/872 Canterbury Road Roselands, Sydney 2196
CONTACT PERSON	James Gilto
EMAIL	james@forspec.com.au
TELEPHONE	02 8021 3517

Name of test material

Actflex 929 HV

Description of test material

Moisture Cured Polyurethane

Date of receipt of test material

30/05/2023

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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 @ 0.7mm. expected dry film 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

Ruby Scardigno

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*	*30.76 N*	*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*	*511%*	*AS 4654.1 Appendix A, Table A1*	CLASS III
Durability: Control Tensile Strength		*3.17 MPa*	*State result*	
Durability: Water Immersion Elongation at Break	*AS 4654.1 Appendix A*	*744 %*	*AS 4654.1 Appendix A, Table A4*	PASS
Durability: Water Immersion Tensile Strength		*3.06 MPa*	*State result*	
Durability: Detergent Immersion Elongation at Break		*781 %*	*AS 4654.1 Appendix A, Table A4*	PASS
Durability: Detergent Immersion Tensile Strength		*2.88 MPa*	*State result*	
Durability: Heat Aging Elongation at Break	*N/A*	*504 %*	*AS 4654.1 Appendix A, Table A4*	PASS
Durability: Heat Aging Tensile Strength		*3.78 MPa*	*State result*	
Temperature Resistance	*AMTM004*	*7.76 g/m^2/24 hours*	*State result*	
Water Vapour Transmission	*ASTM E96*	*7.76 g/m^2/24 hours*	*State result*	

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BOND STRENGTH

Date of test: 21/09/2023

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	28.10	95	0	5	0
Specimen 1 Reading 2	38.23	95	0	5	0
Specimen 1 Reading 3	29.58	95	0	5	0
Specimen 1 Reading 4	52.94	90	0	10	0
Specimen 2 Reading 1	31.26	100	0	0	0

Specimen 2 Reading 2	6.85	100	0	0	0
Specimen 2 Reading 3	4.41	100	0	0	0
Specimen 2 Reading 4	17.56	95	0	5	0
Specimen 3 Reading 1	47.13	95	0	5	0
Specimen 3 Reading 2	55.22	90	0	10	0
Specimen 3 Reading 3	33.52	90	0	10	0
Specimen 3 Reading 4	24.31	95	0	5	0
Average	30.76				
Std Dev	16.27				

Result: 30.76N

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CYCLIC MOVEMENT

Date of test: 12/06-16/06/2023

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	1.351mm

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	12/06/2023	0	☐Yes	☒No	
2	13/06/2023	9	☐Yes	☒No	
3	14/06/2023	21	☐Yes	☒No	
4	15/06/2023	33	☐Yes	☒No	
5	16/06/2023	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*

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: 7/06/2023

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)	23.0-23.8°C
Ambient humidity (conditioning)	52.8-54.8%
Ambient temperature (testing)	22.8°C
Ambient humidity (testing)	51.6% RH
Accuracy grading of test machine	A
Specimen type	Type 2
Elongation measurement type:	Electronic internal measurement
Method of preparation of specimens	Dry Film Supplied
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	1.256	523.459	3.268	785.666
2	1.394	529.738	3.032	401.621
3	1.257	344.844	2.929	367.318
4	1.253	424.331	3.082	446.233
5	1.231	581.495	3.517	555.974
Mean	1.28	480.8	3.17	511
Std Deviation	0.07	94.9	0.23	169

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: 13/07-31/08/2023

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)	23.0-23.8°C
Ambient humidity (conditioning)	52.8-54.8%
Ambient temperature (testing)	22.0-26.4°C
Ambient humidity (testing)	29.2-48.8% RH
Minimum accuracy grading of test machine	A
Specimen type	Type 2
Elongation measurement type:	Electronic internal measurement
Method of preparation of specimens	Dry Film Supplied
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	1.29	385.8	3.49	772
2	1.08	335.3	3.75	670
3	1.28	391.1	3.63	782
7 Day Means	1.22	370.8	3.62	741
7 Day Std Devs	0.12	30.8	0.13	62
4	1.27	399.3	3.18	798
5	1.24	387.3	3.25	774
6	1.22	317.9	3.16	636
28 Day Means	1.24	368.2	3.20	736
28 Day Std Devs	0.03	44.0	0.04	88
7	1.32	344.1	2.93	688

8	1.29	370.6	3.09	741
9	1.30	400.8	3.17	801
56 Day Means	1.30	371.8	3.06	744
56 Day Std Devs	0.01	28.4	0.12	57

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 128% or greater is required.

Result: 744% PASS

NATA WORLD RECOGNISED ACCREDITATION

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DURABILITY OF MEMBRANE

DETERGENT IMMERSION

Date of test: 13/07-31/08/2023

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)	23.0-23.8°C
Ambient humidity (conditioning)	52.8-54.8%
Ambient temperature (testing)	22.0-26.4°C
Ambient humidity (testing)	29.2-48.8% RH
Minimum accuracy grading of test machine	A
Specimen type	Type 2
Elongation measurement type:	Electronic internal measurement
Method of preparation of specimens	Dry Film Supplied
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	1.16	398.7	3.72	797
2	1.32	378.6	3.57	757
3	1.17	347.8	3.56	695
7 Day Means	1.22	375.0	3.62	750
7 Day Std Devs	0.09	25.7	0.09	51
4	1.23	466.3	3.10	933
5	1.21	410.8	3.06	822
6	1.24	426.8	3.02	854
28 Day Means	1.23	434.7	3.06	869
28 Day Std Devs	0.01	28.6	0.04	57
7	1.23	400.4	2.88	801

8	1.26	399.5	2.89	799
9	1.22	371.2	2.88	742
56 Day Means	1.24	390.3	2.88	781
56 Day Std Devs	0.02	16.6	0.01	33

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 128% or greater is required.

Result: 781% PASS

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DURABILITY OF MEMBRANE

HEAT AGING

Date of test: 12/07/2023

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)	23.1-24.8°C
Ambient humidity (conditioning)	50.5-54.2% RH
Ambient temperature (testing)	25.4°C
Ambient humidity (testing)	31.7% RH
Accuracy grading of test machine	A
Specimen type	Type 2
Elongation measurement type:	Electronic internal measurement
Method of preparation of specimens	Dry Film Supplied
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	1.28	271.6	3.85	543
2	1.33	236.4	3.65	473
3	1.28	247.8	3.85	496
Mean	1.29	251.9	3.78	504
Std Deviation	0.03	18.0	0.11	36

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 256% or greater is required.

Result: 504% PASS

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TEMPERATURE RESISTANCE

Date of test: 27/06-11/07/2023

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.

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

Test Parameters:

PARAMETER	VALUE
Cold exposure: Immersion date	21/06/2023 09:00Hrs
Cold exposure: Removal date	23/06/2023 09:00Hrs
Cold exposure: Temperature range	-15.5 - -16°C
Heat exposure: Immersion date	23/06/2023 09:00Hrs
Heat exposure: Removal date	25/06/2023 09:00Hrs
Heat exposure: temperature range	85°C
WVT: Date of test	27/06-11/07/2023
WVT: Test temperature	23.8-25.6°C
WVT: Test humidity	46.9-53.3% RH
WVT: Cup design	Round cup with sealing flange
WVT: Cup sealant	Paraffin Wax
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	1.12	Side A, top of cast film	$Mass_{(g)}=0.0011(Time_{hr})+191.79$	0.9999	7.95
2	1.18	Side A, top of cast film	$Mass_{(g)}=0.0011(Time_{hr})+190.93$	0.9997	7.95
3	1.09	Side B, bottom of cast film	$Mass_{(g)}=0.0011(Time_{hr})+198.29$	0.9998	7.95

4	1.15	Side B, bottom of cast film	$Mass_{(g)}=0.0001(Time_{hr})+168.01$	1	7.21
Mean	1.13				7.76
Std Deviation	0.04				0.37

Result: 7.76 g/m^2/24 hours.

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WATER VAPOUR TRANSMISSION RATE

Date of test: 12/07-26/07/2023

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:	23.8-25.7°C
Test humidity:	47.2-53.3% 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	1.10	Side A, top of cast film	$Mass_{(g)}=0.0011x(Time_{hr})+190.4$	0.9999	7.95
2	1.13	Side A, bottom of cast film	$Mass_{(g)}=0.001x(Time_{hr})+163.16$	0.9999	7.20
3	1.10	Side B, top of cast film	$Mass_{(g)}=0.0011x(Time_{hr})+190.84$	0.9999	7.95
4	1.16	Side B, bottom of cast film	$Mass_{(g)}=0.0011x(Time_{hr})+163.75$	0.9999	7.93
Mean	1.12				7.76
Std Deviation	0.03				0.37

Result: 7.76 g/m^2/24 hours.

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END OF REPORT