

TEST REPORT



Accredited for compliance with ISO/IEC 17025 – Testing
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TEST SUMMARY

Objective

Assessment of supplied sample to AS4654.1-2012

Project

Evaluation of Actflex 5000 to AS 4654.1-2012

Report Number

373-1 AS4654.1-2012

Customer

NAME	Forspec Protective Coatings
ADDRESS	22/872 Canterbury Road, Roselands 2196 NSW
CONTACT PERSON	James Gilto
EMAIL	info@forspec.com.au
TELEPHONE	02 80213517

Name of test material

Actflex 5000

Description of test material

Red Sheet Membrane

Date of receipt of test material

17/09/2024

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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

N/A

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	13.91N	State result		
Acceptance of Cyclic movement	AS 4654.1 Appendix B	Failure not observed	AS 4654.1 Appendix B, Paragraph B4	PASS	
Dimensional Stability	ASTM D6207	No changes observed	State result		
Durability: Control Elongation at Break	AS1145.3	374 %	AS 4654.1 Appendix A, Table A1	CLASS III	
Durability: Control Tensile Strength		3.19 MPa	State result		
Durability: Water Immersion Elongation at Break	AS 4654.1 Appendix A	254 %	AS 4654.1 Appendix A, Table A4	PASS	
Durability: Water Immersion Tensile Strength		3.08 MPa	State result		
Durability: Detergent Immersion Elongation at Break		370 %	AS 4654.1 Appendix A, Table A4	PASS	
Durability: Detergent Immersion Tensile Strength		2.17 MPa	State result		
Durability: Heat Aging Elongation at Break		522 %	AS 4654.1 Appendix A, Table A4	PASS	
Durability: Heat Aging Tensile Strength		2.60 MPa	State result		
Field Seam Strength		AMTM005	71.67N/25mm	State result	
Temperature Resistance: Water Vapour Transmission		AMTM004	0.13 g/m²/24 hours	State result	
Water Vapour Transmission		ASTM E96	0.18 g/m²/24 hours	State result	

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BOND STRENGTH

Date of test: 19/12/2024

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	Actflex EP 250 Primer
Mesh preparation	Wiped with damp cloth, then primed
Mesh primer	Actflex EP 250 Primer

Test Results:

READING	PEAK PEEL FORCE (N)	MODE OF FAILURE			
		SUBSTRATE FAILURE (%)	ADHESIVE FAILURE (%)	COHESIVE FAILURE (%)	SCREEN DELAMINATION (%)
Specimen 1 Reading 1	6.95	0	0	0	100
Specimen 1 Reading 2	13.97	0	0	0	100
Specimen 1 Reading 3	11.11	0	0	0	100
Specimen 1 Reading 4	8.23	0	0	0	100
Specimen 2 Reading 1	20.97	0	0	0	100
Specimen 2 Reading 2	13.74	0	0	0	100

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Specimen 2 Reading 3	14.76	0	0	0	100
Specimen 2 Reading 4	12.85	0	0	0	100
Specimen 3 Reading 1	19.10	0	0	0	100
Specimen 3 Reading 2	12.01	0	0	0	100
Specimen 3 Reading 3	13.24	0	0	0	100
Specimen 3 Reading 4	11.41	0	0	0	100
Average	13.19				
Std Dev	3.95				

Result: 13.19N

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CYCLIC MOVEMENT

Date of test: 11-15/11/2024

Testing:

Testing carried out in accordance with AS 4858.1 Appendix B “Assessment of resistance of waterproofing membranes to cyclic movement”

Additions, deviations and/or exclusions from AS 4858.1 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	1.472 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	11/11/24	0	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
2	12/11/24	14	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
3	13/11/24	27	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
4	14/11/24	40	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
5	15/11/24	50	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> 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: Meets the requirement for CSIRO moving joint test as per AS 4858.1 Appendix B.

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DIMENSIONAL STABILITY

Date of test: 2-5/12/2024

Testing:

Testing carried out in accordance with ASTM D6207 “Standard Test Method for Dimensional Stability of Fabrics to Changes in Humidity and Temperature”

Additions, deviations and/or exclusions from ASTM D6207:

Nil

Test Parameters:

PARAMETER	MEASUREMENT INSTRUMENT	
Preconditioning temperature at 24Hrs	32°C	AMTE042A
Precondition humidity at 24Hrs	15%RH	AMTE042A
Method of sampling used	Test Specimens 150 by 1000mm from lengthwise direction and width wise direction of the roll	

MEASUREMENT

	Initial Pointer Setting	Date	Cycle 1				Cycle 2			
			Pointer Reading at 95% RH & 20°C	Date	Pointer Reading at 15% RH & 32°C	Date	Pointer Reading at 95% RH & 20°C	Date	Pointer Reading at 15% RH & 32°C	Date
Width wise	700mm	2/12	700mm	3/12	700mm	4/12	700mm	4/12	700mm	5/12
Length wise	700mm	2/12	700mm	3/12	700mm	4/12	700mm	4/12	700mm	5/12

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DURABILITY OF MEMBRANE

CONTROL SET

Date of test: 23/10/2024

Testing: Test carried out in accordance with AS1145.3.

Additions, deviations and/or exclusions from AS1145.3: Nil

Test Parameters:

PARAMETER	VALUE
Ambient temperature (conditioning)	22.3-24.8°C
Ambient humidity (conditioning)	27-43.8% RH
Ambient temperature (testing)	24.3°C
Ambient humidity (testing)	44.2% RH
Accuracy grading of test machine	A
Specimen type	Type 2
Elongation measurement type:	Electronic internal measurement
Method of preparation of specimens	Sheet Membrane
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	1.551	191.7	2.93	383
2	1.581	220.2	2.96	440
3	1.582	297.2	3.54	294
4	1.547	199.7	3.26	399
5	1.523	177.1	3.26	354
Mean	1.56	217.2	3.19	374
Std Deviation	0.02	47.4	0.25	55

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: 28/10-16/12/2024

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)	22.3-24.8°C
Ambient humidity (conditioning)	27-43.8% RH
Ambient temperature (testing)	23.2-24.3°C
Ambient humidity (testing)	39.9-48.4% RH
Minimum accuracy grading of test machine	A
Specimen type	Type 2
Elongation measurement type:	Electronic internal measurement
Method of preparation of specimens	Sheet Membrane
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	1.54	123.0	2.99	246
2	1.58	135.5	2.99	271
3	1.59	67.3	2.34	135
7 Day Means	1.57	108.6	2.78	217
7 Day Std Devs	0.03	36.3	0.38	73
4	1.57	129.0	3.37	258
5	1.56	117.3	3.16	235
6	1.57	103.6	2.77	207
28 Day Means	1.56	116.6	3.10	233
28 Day Std Devs	0.01	12.7	0.30	25
7	1.58	125.0	2.95	250

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8	1.53	129.2	3.10	258
9	1.55	127.5	3.20	255
56 Day Means	1.55	127.2	3.08	254
56 Day Std Devs	0.03	2.1	0.13	4

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 94% or greater is required.

Result: 254% PASS

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DURABILITY OF MEMBRANE

DETERGENT IMMERSION

Date of test: 17/12/2024 - 4/02/2025

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)	22.3-24.8°C
Ambient humidity (conditioning)	27-43.8% RH
Ambient temperature (testing)	23.3-24.5°C
Ambient humidity (testing)	39.9-59.1%RH
Minimum accuracy grading of test machine	A
Specimen type	Type 2
Elongation measurement type:	Electronic internal measurement
Method of preparation of specimens	Sheet Membrane
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	1.56	119.5	2.78	239
2	1.48	139.7	3.29	279
3	1.52	93.6	2.46	187
7 Day Means	1.52	117.6	2.84	235
7 Day Std Devs	0.04	23.1	0.42	46
4	1.61	146.3	3.34	293
5	1.54	140.6	3.46	281
6	1.59	167.2	3.88	334
28 Day Means	1.58	151.4	3.56	303
28 Day Std Devs	0.04	14.0	0.28	28
7	1.49	163.4	1.71	327

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8	1.54	173.2	2.46	346
9	1.52	219.2	2.35	438
56 Day Means	1.51	185.3	2.17	370
56 Day Std Devs	0.02	29.8	0.41	60

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 94% or greater is required.

Result: 370% PASS

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DURABILITY OF MEMBRANE

HEAT AGING

Date of test: 22/01/2025

Testing:

Test carried out in accordance with AS 4654.1 Appendix A.

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

Test Parameters:

PARAMETER	VALUE
Ambient temperature (conditioning)	22.3-24.8°C
Ambient humidity (conditioning)	27-43.8% RH
Ambient temperature (testing)	23.6°C
Ambient humidity (testing)	56.6 %RH
Accuracy grading of test machine	A
Specimen type	Type 2
Elongation measurement type:	Electronic internal measurement
Method of preparation of specimens	Sheet Membrane
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	1.58	374.4	3.23	749
2	1.81	178.4	2.32	357
3	1.63	230.2	2.26	460
Mean	1.67	261.0	2.60	522
Std Deviation	0.12	101.5	0.55	203

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 188% or greater is required.

Result: 522% PASS

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FIELD SEAM STRENGTH

Date of test: 30/10/2024

Testing:

Test carried out in accordance with AMTM005.

Additions, deviations and/or exclusions from AMTM005:

Nil

Test Parameters:

PARAMETER	VALUE
Ambient temperature (conditioning)	22.3-24.8°C
Ambient humidity (conditioning)	27-43.8% RH
Ambient temperature (testing)	24.2°C
Ambient humidity (testing)	38.3% RH
Accuracy grading of test machine	A
Elongation measurement type:	Electronic internal measurement
Orientation of specimens to direction of cast	Parallel to direction of casting blade
Clamping device:	Pneumatic jaws
Testing speed:	100mm/min

Test Results:

Replicate	Peak Force (N/25mm)	Mode of Failure	
		Lap joint	Sheet
1	69.04	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	69.94	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	71.96	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	76.48	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5	70.95	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Mean	71.67		
Std Deviation	2.90		
Number of Failures		5	0
% Failure		100	0

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TEMPERATURE RESISTANCE

Date of test: 13-28/01-2025

Testing:

Test carried out in accordance with AMTM004.

Additions, deviations and/or exclusions from AMTM004:

Nil

Test Parameters:

PARAMETER	VALUE
Cold exposure: Immersion date	6/01/2025
Cold exposure: Removal date	8/01/2025
Cold exposure: Temperature range	-15.4 - -16.3°C
Heat exposure: Immersion date	8/01/2025
Heat exposure: Removal date	10/01/2025
Heat exposure: temperature range	85°C
WVT: Date of test	13-28/01/2025
WVT: Test temperature	23.5-24.3°C
WVT: Test humidity	52.9-63.4 %RH
WVT: Cup design	Round, anodised aluminium cup
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 TRANSMISSION RATE (g/m ² /24 hours)
			EQUATION	r ² VALUE	
1	1.45	Side A, top of cast film	Mass(g)=0.00001(Timehr)+172.48	0.8776	0.07
2	1.47	Side A, top of cast film	Mass(g)=0.00002(Timehr)+190.73	0.8009	0.14

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3	1.56	Side B, bottom of cast film	Mass(g)=0.00002(Timehr)+173.64	0.8407	0.14
4	1.39	Side B, bottom of cast film	Mass(g)=0.00002(Timehr)+172.63	0.9633	0.14
Mean	1.47				0.13
Std Deviation	0.07				0.04

Result: 0.13 g/m²/24 hours. PASS

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WATER VAPOUR TRANSMISSION RATE

Date of test: 21/10 - 4/11/2024

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:	23.1-25.0°C
Test humidity:	39.2-44.8% RH
Cup design:	Round, anodised aluminium cup
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	1.45	Side A, top of cast film	Mass _(g) =0.00002(Time _{hr})+190.1	0.7695	0.14
2	1.45	Side A, top of cast film	Mass _(g) =0.00001(Time _{hr})+189.94	0.7679	0.07
3	1.43	Side B, bottom of cast film	Mass _(g) =0.00001(Time _{hr})+190.28	0.6384	0.07
4	1.45	Side B, bottom of cast film	Mass _(g) =0.00006(Time _{hr})+193.1	0.9826	0.43
Mean	1.44				0.18
Std Deviation	0.01				0.17

Result: 0.18 g/m²/24 hours. PASS

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