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TEST REPORT

DC2893/1

TESTING OF 1.0MM BLACK BUTYNOL MEMBRANE TO THE REQUIREMENTS OF AS4654.1 2012

CLIENT
Ardex New Zealand Limited
32 Lane Street
Woolston
Christchurch

TEST SUMMARY

Objective

Testing was completed of 1.0mm black Butynol membrane to the requirements of AS4654.1 2012 *Waterproofing membranes for external above-ground use Part 1: Materials.*

Test sponsor

Ardex New Zealand Limited

32 Lane Street

Woolston

Christchurch

Description of test specimen

The client supplied sheet membrane samples to be tested.

Date of test

20 June 2016

LIMITATION

The results reported here relate only to the items tested.

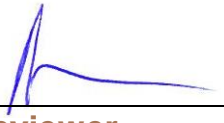
TERMS AND CONDITIONS

This report is issued in accordance with the Terms and Conditions as detailed and agreed in the BRANZ Services Agreement for this work.

SIGNATORIES

Author

Nigel Kell
Senior Technician



Reviewer

Nick Marston
Materials Team Leader

DOCUMENT REVISION STATUS

ISSUE NO.	DATE ISSUED	DESCRIPTION
1	8 August 2017	Initial Issue

1. SUMMARY

AS4654.1 Table 2.1 Requirements – Fully Bonded Membranes – 1.0mm Black Butynol

PROPERTY REQUIRED	METHOD	RESULTS
Abrasion resistance	AS1580.403.2	Pedestrian traffic only
Bond strength	ASTM C794	Concrete 26 N Plywood 24 N
Cyclic movement	CSIRO Moving Joint Test	Pass
Dimensional stability	ASTM D6207	Maximum length change = 2 mm
Elongation at break	AS4654.1 Appendix A	>4.63 MPa >500 % Elongation - Class III
Field seam strength	N/A	N/A - achieved by the overlap and the method of adhesion
Heat ageing	AS/NZS4858	>5.07 MPa >500 % Elongation
Temperature resistance	AS4654.1 Clause 2.6	Pass
Ultraviolet resistance	AS4654.1 Table A4	Pass
Tensile strength	AS4654.1 Table A4	>4.63 MPa >500 % Elongation
Thickness	Various methods	1.09 mm (mean of sample supplied)
Durability	AS4654.1 Table A4	See Note 1
Water vapour transmission rate	ASTM E96	0.04 g/m^2/24 hours

Notes:

1. Durability of membranes is a combined group of assessments as detailed in AS4654.1 Appendix A, Table A4.

Control	>4.63 MPa	>500% Elongation
Water immersion	>4.30 MPa	>500% Elongation
Detergent immersion	>4.23 MPa	>500% Elongation
Heat ageing	>5.07 MPa	>500% Elongation
Ultra violet	>4.76 MPa	>500% Elongation
Bioresistance	Manufacturing guidelines for bioresistance to be followed	

2. ABRASION RESISTANCE

2.1 Testing

Testing carried out in accordance with AS 1580.403.2 using H22 wheels for 1000 cycles. 1000g load on each wheel.

2.2 Results

Results are an average of 6 measurements.

Specimen	Average abraded depth (mm)
#1	0.08
#2	0.12

Max Loss: 0.12 mm

Clause 2.3.2 Trafficable

Pedestrian traffic only – abrasion depth less than 0.2 mm

Occasional service vehicle traffic – abrasion depth less than 0.1 mm

Regular vehicle traffic – abrasion depth less than 0.05 mm

Classification:

Pedestrian traffic only

3. BOND STRENGTH

3.1 Testing

Testing carried out in accordance with ASTM C794.

3.2 Results

Results are an average of 4 samples.

Substrate	Average peel strength (N)
Concrete	26.1 N
Plywood	24.1 N

4. CYCLIC MOVEMENT

4.1 Testing

Testing carried out in accordance with AS4654.1 Appendix B Assessment of resistance of waterproofing membranes to cyclic movement.

4.2 Results

Number of cycles:	50
Cycle Time:	2 hours
Cycle expansion:	50% of control elongation at break
Sample size:	65 mm x 25 mm
Sample span:	4 mm between plates
Sample thickness:	1.09 mm

The test sample achieved a control elongation at break of >500% as per AS4654 Appendix A. For a Class III membrane the extension movement used for cycling is 4mm.

Number of cycles completed:	50
Surface crazing:	Nil
Surface tears:	Nil
Membrane rupture:	Nil
Result:	Meets the requirement for the Moving Joint Test

5. DIMENSIONAL STABILITY

5.1 Testing

Test carried out in accordance with D6207-03.

5.2 Results

	Length measurements (mm)					Final - Initial readings (mm)	Max change in length (mm)
	Initial Dry reading	Cycle 1		Cycle 2			
Orientation		Wet reading	Dry reading	Wet reading	Dry reading		
Lengthwise	901	901	902	900	902	-1	2
Widthwise	903	903	904	902	904	-1	2

6. ELONGATION AT BREAK

6.1 Testing

Test carried out in accordance with AS4654.1 Appendix A.

6.2 Results

Results are an average of 5 samples.

Mean sample thickness (mm)	Tensile strength (MPa)	Elongation at break (%)
1.09	>4.63	>500

Requirement for Class III: The specimens have an elongation at break of >300%

Classification: Class III (high extensibility)

7. HEAT AGEING

7.1 Testing

Testing carried out in accordance with AS4654.1 Appendix A.

7.2 Results

Results are an average of 6 samples.

Mean sample thickness (mm)	Tensile strength (MPa)	Elongation at break (%)
1.09	>5.07	>500

Requirement: The specimens require an elongation at break greater than 50% of the control sample. There was no deterioration in the elongation at break performance.

Result: Pass

8. TEMPERATURE RESISTANCE

8.1 Testing

Testing carried out in accordance with AS4654.1 Appendix A. Samples were exposed for 2 days at 85°C and samples were exposed for 2 days at -15°C.

8.2 Results

Results are an average of 6 samples.

High temperature, 85°C

Mean sample thickness (mm)	Tensile strength (MPa)	Elongation at break (%)
1.09	>4.95	>500

Low temperature, -15°C

Mean sample thickness (mm)	Tensile strength (MPa)	Elongation at break (%)
1.09	>4.71	>500

Requirement: The membrane shall remain waterproof when subjected to temperatures likely to be encountered in use: for Australia these would be within the range -15°C to 85°C.

Samples shall exhibit no cracking, fractures or surface defects after exposure.

Result : Pass

9. ULTRA VIOLET RESISTANCE

9.1 Testing

Testing carried out in accordance with AS4654.1 Table A4, 1008 hrs in a QUV.

9.2 Results

Mean sample thickness (mm)	Tensile strength (MPa)	Elongation at break (%)
1.09	>4.76	>500

10. TENSILE STRENGTH

10.1 Testing

Testing carried out in accordance with AS4654.1 Appendix A.

10.2 Results

Results are an average of 6 samples.

Mean sample thickness (mm)	Tensile strength (MPa)	Elongation at break (%)
1.09	>4.63	>500

11. DURABILITY

11.1 Testing

Testing carried out in accordance with AS4654.1 Appendix A.

11.2 Results

	Tensile Strength	Elongation at break	Pass / Fail
Control	>4.63 MPa	>500 % Elongation	N/A
Water immersion	>4.30* MPa	>500 % Elongation	Pass
Detergent immersion	>4.23 MPa	>500 % Elongation	Pass
Heat ageing	>5.07 MPa	>500 % Elongation	Pass
Ultra violet	>4.76 MPa	>500 % Elongation	Pass
Bioresistance	Manufacturing guidelines for bioresistance to be followed		

*Mean of 3 results only

12. WATER VAPOUR TRANSMISSION RATE

12.1 Testing

Testing carried out in accordance with ASTM E96 desiccant method.

12.2 Results

Thickness (mm)	Mean WVTR (g/m^2/24 hours)	Minimum result (g/m^2/24 hours)	Maximum result (g/m^2/24 hours)
1.09	0.04	0.00	0.04