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TEST REPORT

DC2635/17

TESTING OF VULKEM 350-R MEMBRANE TO THE REQUIREMENTS OF AS4654.1 2012

CLIENT
Tremco Pty Ltd
PO Box 7124
Silverwater
Rydalmere
NSW 2128
Australia

TEST SUMMARY

Objective

Testing was completed on the Vulkem 350-R membrane to the requirements of AS4654.1 2012 *Waterproofing membranes for external above-ground use Part 1: Materials.*

Summary

Passing results were obtained for the Vulkem 350-R where requirements are stated in the AS4654.1 2012 Standard. The Vulkem 350-R met the requirements to be classified as Class III (high extensibility).

Test sponsor

Tremco Pty Ltd
PO Box 7124
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Description of test specimen

The client supplied sheet membrane samples to be tested.

Date of test

2 May 2016

LIMITATION

The results reported here relate only to the items tested.

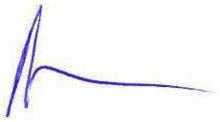
TERMS AND CONDITIONS

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	2 May 2016	Initial Issue – results for Bond Strength and Temperature Resistance not reported
2	13 May 2016	Final report containing all test results
3	28 November 2017	Revised formatting

1. SUMMARY

AS4654.1 Table 2.1 Requirements – Fully Bonded Membranes - Vulkem 350-R

PROPERTY REQUIRED	METHOD	RESULTS	
Abrasion resistance	AS1580.403.2	N/A – non - exposed	
Bond strength (Average peel strength)	ASTM C794	Concrete masonry 33 N Plywood 129 N	
Cyclic movement	Moving Joint Test		Pass
Dimensional stability	ASTM D6207	N/A – liquid membrane	
Elongation at break	AS4654.1 Appendix A	1.69 MPa 397% Elongation	Class III
Field seam strength	N/A	N/A – liquid membrane	
Heat ageing	AS/NZS4858	2.40 MPa 315% Elongation	Pass
Temperature resistance	AS4654.1 Clause 2.6		Pass
Ultraviolet resistance	AS4654.1 Table A4	N/A – non - exposed	
Tensile strength	AS4654.1 Table A4	1.69 MPa 397% Elongation	
Thickness	Various methods	0.80 mm (mean of sample supplied) See Note 1	
Durability	AS4654.1 Table A4	See Note 2	Pass
Water vapour transmission rate	ASTM E96	16.0 g/m^2/24 hours	

Notes:

1. Thickness measurement – the product is a liquid applied waterproofing membrane. The thickness of the membrane will be determined by application.

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

Control	1.69 MPa	397% Elongation	
Water immersion	1.47 MPa	417% Elongation	Pass
Detergent immersion	1.66 MPa	495% Elongation	Pass
Heat ageing	2.40 MPa	315% Elongation	Pass
Ultra violet	Not assessed as membrane in non – exposed		
Bioresistance	Not assessed as membrane in non - exposed		

2. BOND STRENGTH

2.1 Testing

Testing is being carried out in accordance with ASTM C794 on concrete masonry, plywood and fibre cement.

2.2 Results

Results are an average of 4 samples.

Substrate	Average peel strength (N)
Concrete masonry	33
Plywood	129
Fibre cement	170

3. CYCLIC MOVEMENT

3.1 Testing

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

3.2 Results

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:	0.80 mm

The test sample achieved a control elongation at break of 397% as per AS4654 Appendix A. For a Class III membrane the extension movement used for cycling is 4 mm.

Number of cycles completed:	50
Surface crazing:	Nil
Surface tears:	Nil
Membrane rupture:	Nil

Result: Meets the requirement for the Moving Joint Test

4. ELONGATION AT BREAK

4.1 Testing

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

4.2 Results

Results are an average of 6 samples.

Mean sample thickness (mm)	Tensile strength (MPa)	Elongation at break (%)
0.80	1.69	397

Requirement for Class III: The specimens have an elongation at break ≥ 300 %.

Classification: Class III (high extensibility)

5. HEAT AGEING

5.1 Testing

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

5.2 Results

Results are an average of 6 samples.

Mean sample thickness (mm)	Tensile strength (MPa)	Elongation at break (%)
0.80	2.40	315

Requirement: The specimens require an elongation at break greater than 50% of the control sample, 397%. An elongation of less than 199% is a fail.

Result : Pass

6. TEMPERATURE RESISTANCE

6.1 Testing

Testing is being carried out in accordance with AS4654.1 Appendix A. Samples have been exposed for 2 days at 85°C and for 2 days at -15°C.

6.2 Results

Results are an average of 6 samples.

High temperature, 85°C

Mean sample thickness (mm)	Tensile strength (MPa)	Elongation at break (%)
0.80	2.44	322

Low temperature, -15°C

Mean sample thickness (mm)	Tensile strength (MPa)	Elongation at break (%)
0.80	2.15	455

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

7. TENSILE STRENGTH

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 (%)
0.80	1.69	397

8. DURABILITY

8.1 Testing

Testing carried out in accordance with AS4654.1 Appendix A

8.2 Results

	Tensile Strength	Elongation at break	Pass / Fail
Control	1.69 MPa	397% Elongation	N/A
Water immersion	1.47 MPa	417% Elongation	Pass
Detergent immersion	1.66 MPa	495% Elongation	Pass
Heat ageing	2.40 MPa	315% Elongation	Pass
Ultra violet	Not assessed as membrane in non - exposed		
Bioresistance	Not assessed as membrane in non - exposed		

9. WATER VAPOUR TRANSMISSION RATE

9.1 Testing

Testing carried out in accordance with ASTM E96 desiccant method. Water vapour transmission rate (WVTR) was determined for 3 replicate samples.

9.2 Results

Thickness (mm)	WVTR (g/m^2/24 hours)	Coefficient of variation (%)	Minimum result (g/m^2/24 hours)	Maximum result (g/m^2/24 hours)
0.80	16.0	8.1	14.6	17.1