



Australia's National
Science Agency

Assessment of:
AS/NZS 4858:2004

Enviro 700x
Wet area membranes

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Limitation

The results reported herein relate only to the item(s) tested.

Customer

Waterproofing Technologies Pty Ltd

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Statement of Conformity

This Assessment report documents the results and assessments of products produced by,

Waterproofing Technologies Pty Ltd

295 Princes Hwy

St Peters

2044

NSW

Australia

Submitted and designated as follows,

Enviro 700x

The products as submitted confirmed with the specified requirements of the following criteria,

AS/NZS 4858:2004

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1 Executive Summary

Test Standard: Testing was conducted on Wet Area Membranes to assess its performance for: water vapour transmission; water absorption; cyclic movement; durability and suitability over particleboard. The wet area membranes properties were tested in accordance with Australian Standard AS/NZS 4858:2004.

All methods were carried out according to Table 8.1 and exposed against the performance criteria of Table A1.

Test results: Enviro 700x met the performance criteria.

When assessed in accordance with AS/NZS 4858:2004 wet area membranes. The following table shows the Test Samples performance as assessed from testing.

Table 1 Summary of test requirements and test specimen results for AS/NZS 4858:2004

TEST	METHOD	REQUIREMENTS	RESULT
(a) Water Moisture Transmission Rate	ASTM E 96 Desiccant method for Determining Water Vapour Transmission (WVT)	State result Water Vapour transmission shall be $<8 \text{ g} / \text{m}^3 / 24\text{hrs}$. If $> 8 \text{ g} / \text{m}^3 / 24\text{hrs}$, additional testing will be required to establish suitability for use over particleboard.	WVT = $16.80 \text{ g/m}^2/24\text{hrs}$ Permeance = $115.40 \text{ ng/Pa.s.m}^2$
(b) Water Absorption	AS 3558.1(sample size modified to be a 50mm x 50mm by the thickness as used in practice)	Maximum record result of percentage mass $w_m\% = (w_m^2 - w_m^1) / w_m^1 \times 100$.	Max. mass 1.19 %
(c) Acceptance of movement	AS/NZS 4858 Appendix B for assessment of cyclic movement of membrane	Pass or fail criteria by observing any cracking, rupture holing or extending through the thickness for more than 1 mm in from the edge of the specimen.	PASS
(d) Durability 1. Control 2. Water immersion 3. Bleach immersion 4. Detergent immersion 5. Heat ageing at 50°C	AS/NZS 4858:2004 Appendix A for assessment of membranes durability	Pass or fail criteria - compared to control specimens: elongation at break shall be not less than 25% for water, bleach & detergent immersion specimens, not less than 50% for heat ageing specimens.	CLASS III PASS PASS PASS PASS
(e) Suitability over particleboard	AS/NZS 4858:2004 Appendix C for assessment of membranes durability	Moisture content at al 6 locations shall be less than 10% above the average of the 2 control measurements taken on the same day. Will not be required for testing if water vapour transmission shall be $<8 \text{ g} / \text{m}^3 / 24\text{hrs}$.	PASS

Note: The above is only a summary of the overall results, and must be read in conjunction with the relevant sections of this report.

2 Introduction

CSIRO Services was engaged to assess a waterproofing membrane for compliance against the AS/NZS 4858:2004 according to Table 8.1, with compliance confirmed against the performance criteria of Table A1, B4 and C5. The details for this assessment are listed in Table 3 below.

Table 2 Details of submitted test specimen

CSIRO Agreement No.:	TEMP 20220523
TEST SPONSOR:	Waterproofing Technologies Pty Ltd
PRODUCT DESCRIPTION:	Enviro 700x
Specimen Received Date:	17/06/2022

Note: CSIRO accepts no responsibility for the selection of specimens. The results in this report apply to the specimens tested and may not be applicable to other specimens of the same product.

This report details the performance, testing conditions and outcomes of the specimen assessed for wet area membranes. Table 3 details the sponsor's specified schedule of tests for the product.

Table 3 Details of the schedule for testing of the submitted specimen

CSIRO Agreement No.:	20220329.03
TEST SCHEDULE:	AS/NZS 4858:2004 wet area membranes, Clause 8 Table 8.1: a) Moisture vapour transmission rate - ASTM Designation E96/E96M – 16, 'Standard Test Methods for Water Vapour Transmission'; b) Water absorption AS 3558.1-1999 'Method of testing plastics and composite materials sanitary plumbing fixtures with sample size modified to be a 50mm x 50mm by the thickness as used in practice. c) Acceptance of cyclic movement; Appendix B 'Assessment of resistance of waterproofing membranes to cyclic movement'; d) Durability - Appendix A 'Assessment of durability of waterproofing membranes: - Table A1 (a) Controls - Table A1 (b) Water immersion - Table A1 (c) Bleach immersion - Table A1 (d).Detergent immersion - Table A1 (e) Heat aging 50°C e) Suitability for use over particleboard. Note: this test is only performed for membranes that have a water vapour transmission rate greater than 8 g/m²/24hrs in accordance with ASTM E96.

3 Test specimen description

The Enviro 700x supplied by Waterproofing Technologies Pty Ltd is single component, low odour, moisture cured polyurethane elastomer waterproofing system. The nominal size of the membrane was 300 mm wide, 300 mm length and 1.40 mm thick.

The supplied specimen for assessment is shown below in Figures 1 and 2.



Figure 1 Top face of specimen Enviro 700x



Figure 2 Underside of specimen Enviro 700x

4 Test Methodology

4.1 ASTM E96/E96M – 16 Water Vapour Transmission of materials

This Standard outlines the method for determining water vapour transmission (WVT) through the membrane using the desiccant and dummy specimen method.

Four test samples were prepared by mechanical sealed using two neoprenes and a teflon gasket placed onto the open side of the test cups. The test cups contain dried desiccant with the trafficable side facing up were placed in a climate-controlled environment with periodic weighing so that the rate of water vapour movement through the membrane to the desiccant can be determined.

The exposed area (test dish face) for each of the cups was 0.002827 m². The test cups (all except the dummy sample, no desiccant) had a 6 mm gap between the desiccant and the underside of the membrane.

All test assemblies were kept in a Steridium environmental where chamber temperature humidity are maintained at a temperature of 23 ±2°C and 60 ±5% relative humidity, for the 47 days duration.

Measurements taken each afternoon (excluding weekends) over this period to determine the weight change and permeance of the membrane.

4.2 AS 3558.1-1999 Determination of water absorption characteristics

This Standard outlines the method for determining the percentage of mass change of the membrane measured after a period of immersion in water, followed by a period of being oven dried.

Three circular test samples of 80 mm diameter (5027 mm²) were cut from Enviro 700x, before been placed in an oven set at 50 ±5°C for a duration of 24 ±0.5 hrs conditioning. Samples were removed from oven (cooled) then weighed and recorded (m¹) before insertion in a test jig. The test jig was used to expose the trafficable surface face of the samples to water to a depth of 50 mm above the surface for a duration of 24 ±0.25 hrs. After the completion of this exposure period the samples were wiped dry and then weighed and recorded (m²) again, determining the percentage increase in weight measured.

4.3 AS/NZS 4858-2004 Appendix B Resistance to cyclic movement

This Standard outlines the method for determining resistance of membrane to cyclic movement set at 4mm extension.

A rectangular test sample of 65 mm x 25 mm x 1.36 mm was cut from the Enviro 700x, then held in the test grips (70(w) x 45(l) x 20(t) mm), exposing a 25 x 2 mm central portion of the sample.

An Applied Test Systems Series 904 Vertical Sealant Tester was used for testing. The vertical sealant testing machine used software for cyclic movement control. The vertical testing machine was set to elongate the clamped test sample for the cycling is 4mm extension. Once the test piece reached full extension, it then returned to its original position, which completed one cycle of movement. The elongation and return was then repeated to complete a 50 cycle movement test, each cycle conducted over a nominal 2 hour period.

The test sample was inspected for signs of breakage or cracks and measured for any necking. A reduction in width of more than 1 mm inwards from the edge of the test sample constitutes a failure.

4.4 AS/NZS 4858-2004 Appendix A Durability of membrane

This Standard outlines the method for determining resistance of the membrane's durability after conditioning in various solutions over set periods, then assessed against an unconditioned material.

Testing of the Enviro 700x was in accordance with Appendix A Durability of membranes. As specified in A3 the membrane test samples were prepared in accordance with AS 1145.3-2001, Type 5, dumb-bell samples 6mm width with a 25mm gauge length. Test specimens were exposed and conditioned to those requirements specified in Table A1 of AS/NZS 4858:2004. In accordance with A2 Testing, Instron 5585H (ERM.030.043) testing machine, fitted with a calibrated 5kN load cell, was used to record the elongation at break and tensile strength. The test rate of 200 mm/min. used for testing elongation at break of the immersed test specimens were compared to the control test specimens

4.5 AS/NZS 4858-2004 Appendix C Suitability over Particleboard

This method enables the assessment of suitability of flexible waterproofing membranes when used over particleboard flooring, for membranes that have a water vapour transmission rate (WVTR) greater than 8g/m²/24hrs when determined by ASTM E96. A test sample (a piece of particleboard cut from the flooring at least 500 x 200 mm) is placed on a stand that allows access to the underside, for measurements with a moisture meter. The membrane is cured on the topside of this board and allowed to cure as per the manufacturer's specifications. After the membrane is cured, the tray is flooded with water to a depth of 25mm. The water is maintained at this depth and moisture readings taken at specified intervals for a minimum of 42 days. For the membrane to pass, the moisture content shall not reach 10% above the average of 2 control measurements, at any of the 6 test locations.

5 Results

5.1 ATSM E96/E96M - 16 Water Vapour Transmission of materials

Results reproduced from base variant product, reference report 8454

The periodic measurements of the membrane test samples were recorded as shown in Table 4, below.

	In	Out
Date of Preconditioning:	12/08/2022	19/08/2022
Date of test:	19/08/2022	05/10/2022

Table 4 Water Vapour Transmission test results

Specimens No.	Water Vapour Transmission (g/m ² 24hr)	Permeance (ng/Pa.s.m ²)
8454/57	16.49	113.26
8454/58	17.02	116.86
8454/59	16.90	116.07
Average	16.80	115.40

The performance criteria set out in AS/NZS 4858 – 2004, Table 8.1, specifies a water vapour transmission rate of less than 8 g/m² 24 hr, or 0.33 g/m² hr.

5.2 AS 3558.1-1999 Determination of water absorption characteristics

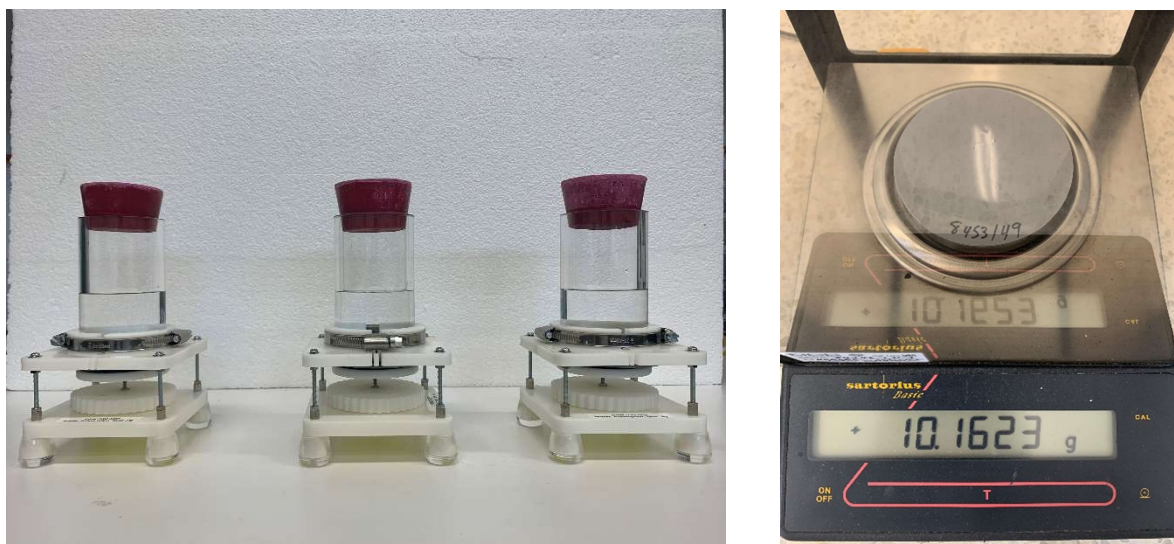
The test result for water absorption is shown in Table 5 below. The test specimen completed a cold tap water exposure and its percentage increase in mass determined and averaged.

	In	Out
Date of Preconditioning:	27/07/2022	28/07/2022
Date of test:	28/07/2022	29/07/2022

Table 5 Water absorption tests results

Product	Thickness Average	Specimens	Specimen weight after conditioning	Specimen weight after exposure	Water absorption percentage
	mm		$m^1 = \text{grams}$	$m^2 = \text{grams}$	$M \% = (m^2 - m^1) / m^1 \times 100$
Enviro 700x	1.39	8453/49	10.1623	10.2823	1.18 %
	1.42	8453/50	10.4052	10.5288	1.19 %
	1.44	8453/51	10.5036	10.6253	1.16 %
				Average	1.18 %

Figure 3 Test apparatus and weighing of Enviro 700x



The performance criteria set out in AS/NZS 4858 – 2004, Table 8.1 (b), does not specify a limit. The maximum water absorption measured on the waterproofing membrane specimen was 1.19 %.

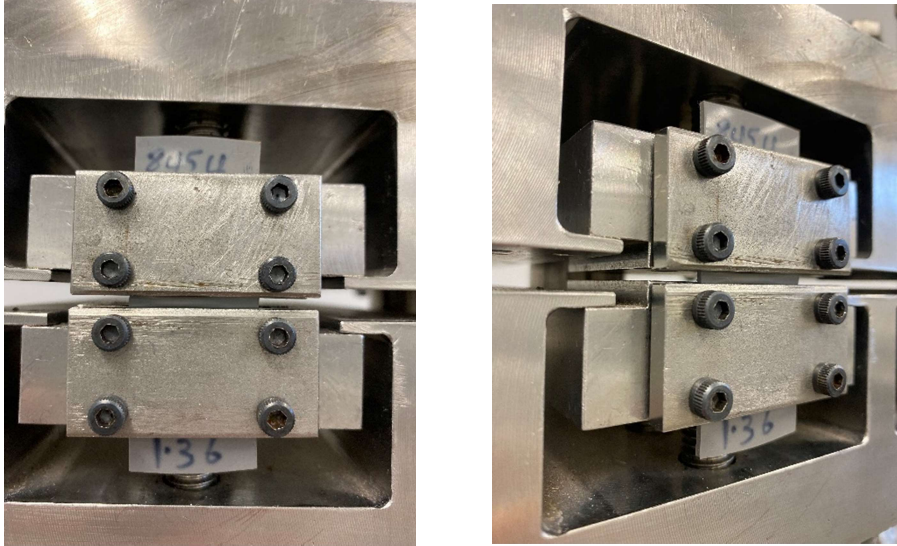
5.3 AS/NZS 4858-2004 Appendix B Resistance to Cyclic Movement

Results reproduced from base variant product, reference report 8454

The test result for cyclic movement of the waterproofing membrane test sample is shown in Table 6 below. The test sample completed 50 cycles for the nominal 2 hour period.

	In	Out
Date of Preconditioning:	12/08/2022	19/08/2022
Date of test:	19/08/2022	23/08/2022

Table 6 Test sample holding during cyclic movement and test results

Specimen No.:	8454/48	
Test specimen	Test specimen 65 (l) mm x 25 (w) mm x 1.36 (t) mm section	
Membrane Classification	CLASS III	
Elongation at break:	Maximum strain used for the cycling shall be 4mm of extension	
Clamped test specimen of cyclic test:		
Observations		
Day 1		
Day 2		
Day 3		
Day 4		
Surface Defects		
Crazing		
Surface Tear		
Membrane Rupture		
Final Result	PASS	50 cycles

The performance criteria set out in AS/NZS 4858 – 2004, Table 8.1 (c) and section B4, pass or fail criteria by observing any cracking, rupture or necking of more than 1 mm down from original width.

5.4 AS/NZS 4858-2004 Appendix A Durability of membrane

The tensile strength and elongation at break were recorded for the control and immersed test samples. Criteria for pass or failure of the immersed test samples were then compared to the control samples. AS/NZS 4858:2004 Table 6.1 joint movement bond breaker was also referenced in Table 7, below.

Control

	In	Out
Date of Preconditioning:	27/07/2022	15/08/2022
Date of test:	15/08/2022	

Table 7 Durability test results - control

Control Specimens						
	Break Force (N)	Thickness (mm)	Tensile strength (F/A) (MPa)	Elongation at break		Class
				(mm)	(%)	
8453/01	33.42	1.44	3.87	190.31	761	III
8453/02	35.66	1.44	4.13	205.26	821	
8453/03	27.79	1.43	3.24	169.63	679	
8453/04	27.12	1.43	3.16	184.28	737	
8453/05	24.85	1.42	2.92	164.14	657	
Average	29.77	1.43	3.46	182.72	731	

Table 5.1: Classification of Membranes

CLASS I – Elongation at break <59%

CLASS II – Elongation at break 60-299%

CLASS III – Elongation at break ≥300%

Table 6.1 Class III membrane, a 12mm wide bond breaker/tape should be applied over a joint to accommodate the joint opening by up to 5 mm.

Figure 4 Images of test sample performing durability load / elongation test



Water Immersion

	In	Out
Date of Preconditioning (7D):	8/08/2022	15/08/2022
Date in Water (7D):	15/08/2022	22/08/2022
Date of Test (7D):	22/08/2022	-
Date of Preconditioning (28D):	8/08/2022	15/08/2022
Date in Water (28D):	15/08/2022	12/09/2022
Date of Test (28D):	12/09/2021	-
Date of Preconditioning (56D):	8/08/2022	15/08/2022
Date in Water (56D):	15/08/2022	10/10/2022
Date of Test (56D):	10/10/2022	-

Table 8 Durability test results – Water immersion

Water Immersion Specimens						
	Average Break Force (N)	Average Thickness (mm)	Average Tensile strength (F/A) (MPa)	Average Elongation at break		PASS/FAIL
				(mm)	(%)	
7 day period	25.87	1.41	3.05	194.05	776	PASS
28 day period	21.69	1.41	2.57	188.51	754	PASS
56 day period	23.86	1.41	2.83	187.72	751	PASS

Table 5.1 & A1: Pass / Fail and Criteria compared with control specimens

PASS – Elongation at break shall not be less than 50% retention of elongation at break of the controls for the bond breakers given in Table 6.1. For an elongation between 50% and 25% of the controls the membrane requires additional bond relief above that given in Table 6.1.

Bleach Immersion

	In	Out
Date of Preconditioning (7D):	8/08/2022	15/08/2022
Date in Bleach (7D):	15/08/2022	22/08/2022
Date of Test (7D):	22/08/2022	-
Date of Preconditioning (28D):	8/08/2022	15/08/2022
Date in Bleach (28D):	15/08/2022	12/09/2022
Date of Test (28D):	12/09/2021	-
Date of Preconditioning (56D):	8/08/2022	15/08/2022
Date in Bleach (56D):	15/08/2022	10/10/2022
Date of Test (56D):	10/10/2022	-

Table 9 Durability test results – Bleach immersion

Bleach Immersion Specimens						
	Average Break Force (N)	Average Thickness (mm)	Average Tensile strength (F/A) (MPa)	Average Elongation at break		PASS/FAIL
				(mm)	(%)	
7 day period	22.40	1.37	2.73	188.15	753	PASS
28 day period	21.18	1.37	2.57	177.16	709	PASS
56 day period	23.29	1.37	2.84	210.34	841	PASS

Table 5.1 & A1: Pass / Fail and Criteria compared with control specimens

PASS – Elongation at break shall not be less than 50% retention of elongation at break of the controls for the bond breakers given in Table 6.1. For an elongation between 50% and 25% of the controls the membrane requires additional bond relief above that given in Table 6.1.

Detergent Immersion

	In	Out
Date of Preconditioning (7D):	8/08/2022	15/08/2022
Date in Detergent (7D):	15/08/2022	22/08/2022
Date of Test (7D):	22/08/2022	-
Date of Preconditioning (28D):	8/08/2022	15/08/2022
Date in Detergent (28D):	15/08/2022	12/09/2022
Date of Test (28D):	12/09/2021	-
Date of Preconditioning (56D):	8/08/2022	15/08/2022
Date in Detergent (56D):	15/08/2022	10/10/2022
Date of Test (56D):	10/10/2022	-

Table 10 Durability test results – Detergent immersion

Detergent Immersion Specimens						
	Average Break Force (N)	Average Thickness (mm)	Average Tensile strength (F/A) (MPa)	Average Elongation at break		PASS/FAIL
				(mm)	(%)	
7 day period	17.72	1.36	2.17	169.37	677	PASS
28 day period	23.81	1.36	2.92	190.19	761	PASS
56 day period	17.08	1.36	2.10	167.08	668	PASS

Table 5.1 & A1: Pass / Fail and Criteria compared with control specimens

PASS – Elongation at break shall not be less than 50% retention of elongation at break of the controls for the bond breakers given in Table 6.1. For an elongation between 50% and 25% of the controls the membrane requires additional bond relief above that given in Table 6.1.

Heat Ageing

	In	Out
Date of Preconditioning:	08/08/2022	16/08/2022
Date in Oven:	16/08/2022	23/08/2022
Date of Test:	25/08/2022	-

Table 11 Durability test results – Heat Ageing

Heat Ageing @ 50°C						
	Average Break Force (N)	Average Thickness (mm)	Average Tensile strength (F/A) (MPa)	Average Elongation at break		PASS/FAIL
				(mm)	(%)	
7 day period	31.29	1.35	3.86	203.84	815	PASS

Table 5.1 & A1: Pass / Fail and Criteria compared with control specimens

PASS – Elongation at break shall not be less than 50% retention of elongation at break of the controls

5.5 AS/NZS 4858-2004 Appendix C Suitability for use over particleboard

The membrane is cured in the particleboard tray and exposed to water immersion. Moisture readings are taken at specified intervals and recorded in Table 12 for a minimum of 42 days. For the membrane to pass, the moisture content shall not reach 10% above the average of 2 control measurements, at any of the 6 test locations.

	In	Out
Date of Preconditioning:	10/01/2023	17/01/2023
Date of test:	17/01/2023	28/02/2023

Table 12 Moisture Content Pass/Fail Criteria

Days	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
Initial (0)	-	-	-	-	-	-
3.00	PASS	PASS	PASS	PASS	PASS	PASS
7.00	PASS	PASS	PASS	PASS	PASS	PASS
17.00	PASS	PASS	PASS	PASS	PASS	PASS
21.00	PASS	PASS	PASS	PASS	PASS	PASS
28.00	PASS	PASS	PASS	PASS	PASS	PASS
35.00	PASS	PASS	PASS	PASS	PASS	PASS
42.00	PASS	PASS	PASS	PASS	PASS	PASS
	PASS	PASS	PASS	PASS	PASS	PASS

According to Criteria C5 the test specimen recorded a result of:

PASS

6 Comments

The comments below relate to – Enviro 700x

The Test Sample, as described, when subjected to the test methods of:
AS/NZS 4858:2004 Wet Area Membranes

- Properties:
- water vapour transmission
 - water absorption
 - cyclic movement CLASS III
 - durability CLASS III
 - suitability over particleboard

Met the performance criteria

End of report