



**CSIRO MANUFACTURING  
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TO: Jim Gerbes – Hitchins NZ Ltd Fax No.: 0015 0800 448 622

FROM: Paul Bailey Date: 26 September 2003

SUBJECT: Traffigard Appraisal TO 247 Pages: 2

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Jim,

In response to the matters raised Rodney District Council, we wish to make the following comments.

At the time of the Appraisal there were no New Zealand standards for membranes however there are clauses in the New Zealand Building Code that require a performance for waterproofing systems.

The relevant Clauses are as follows:

For roofs, decks and balconies:

- E2.3.2 Roofs and exterior walls shall prevent the penetration of water that could cause undue dampness, or damage to *building elements*.
- E2.3.4 *Building elements* susceptible to damage shall be protected from adverse effects of moisture entering the space below suspended floors.

If the Formwal Traffigard 2000+ membrane system is installed in accordance to the conditions listed in ABSAC Technical Opinion 247 it is our opinion that it will meet the requirements of both of these clauses when used on roofs, decks and balconies.

For internal wet areas:

- E3.3.3 Floor surfaces of any space containing sanitary fixtures or laundering facilities shall be impervious and easily cleaned.
- E3.3.4 Wall surfaces adjacent to sanitary fixtures or laundering facilities shall be impervious and easily cleaned.
- E3.3.6 Water splash shall be prevented from penetrating behind linings or into *concealed spaces*.



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If the Formwal Traffigard 2000+ membrane system is installed in accordance to the conditions listed in ABSAC Technical Opinion 247 it is our opinion that it will meet the impervious requirements of these clauses when used in wet areas in that the membrane system will prevent water migrating behind it.

We also wish to advise that the appraisal officer for the Formwal Traffigard 2000+ membrane system, had over ten years of experience in assessing the 'fitness for purpose' of waterproofing membranes and is also on the Standards Committee for wet areas. The appraisal takes into account physical properties of the membrane as well as installation procedures with input from Regional Review Committees throughout Australia. There are builders as well as regulators on these committees and any comments showing potential problems are dealt with prior to the issuing of any Technical Opinion.

In relation to durability aspects of Formwal Traffigard 2000+ the Technical Opinion refers to information provided to us from Hitchins. We did not undertake any specific tests on the durability of the product.

I trust this is of assistance and if you require any further information or clarification please do not hesitate to contact me.

Regards

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## TECHNICAL OPINION 247 February 1999

### Formwal Traffigard 2000+

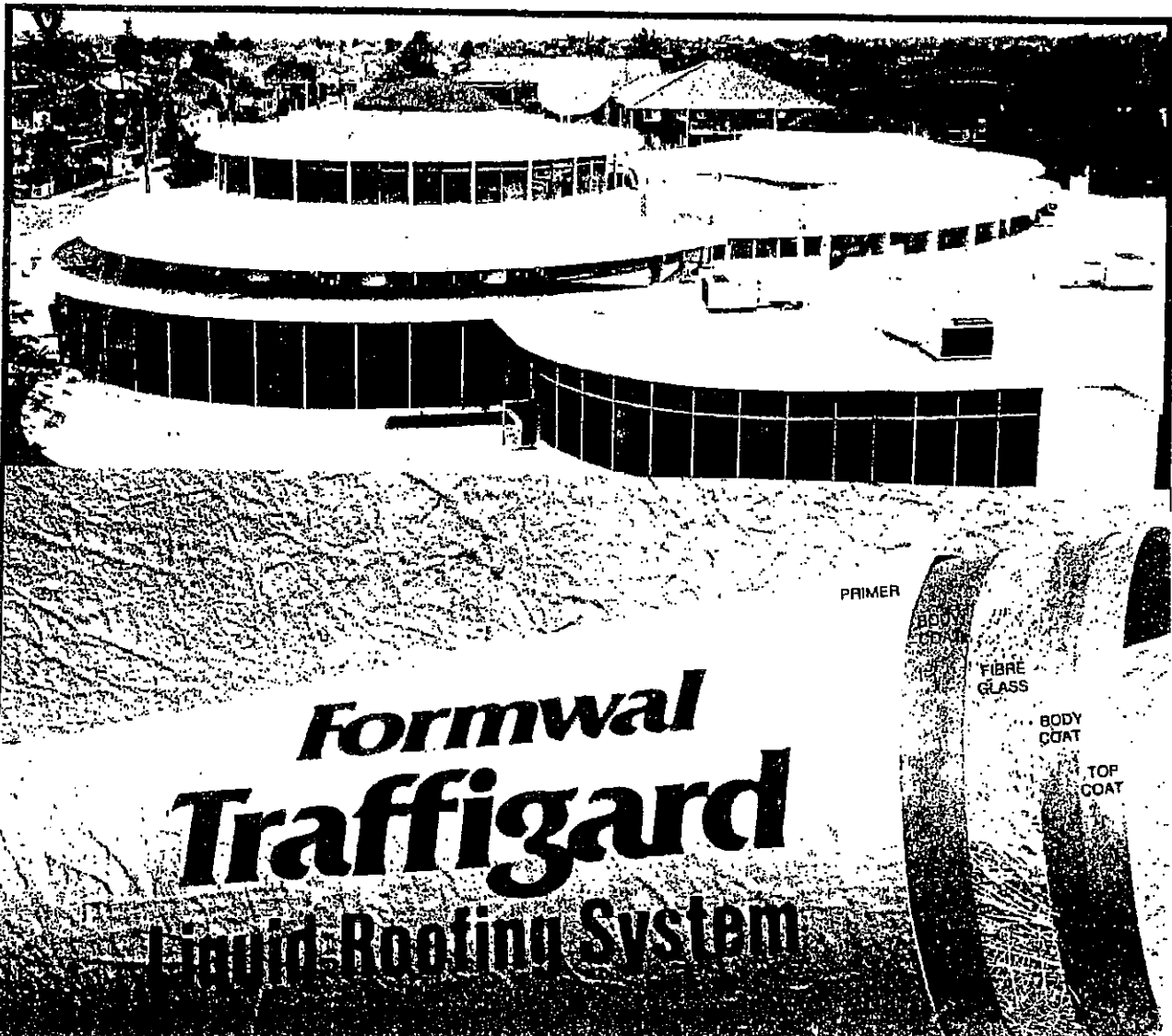
#### PURPOSE

A waterproofing membrane system for use in wet areas including shower recess bases (the membrane forms a shower tray), and associated floors and walls all of which are to be subsequently tiled and for waterproofing roofs, decks, plazas and carparks

#### APPLICANT

Hitchins Pty Ltd (ACN 074 433 275), 21 Cowper Street, Granville, New South Wales 2142 (Manufacturer)

## COMPLETE BUILDING PROTECTION SYSTEMS



## TECHNICAL OPINION

In the opinion of ABSAC, the Formwal Traffigard 2000+ Membrane System will satisfy the requirements of Standards Australia, AS 3740-1994 'Waterproofing of wet areas within residential buildings' (Amdt 1 - September 1995) for waterproofing wet areas including shower recess bases (the membrane forms a shower tray) and associated floors and walls all of which are to be subsequently tiled and provides a suitable waterproofing membrane for waterproofing roofs, decks, plazas and carparks provided that:

### General:

1. The membrane is installed in accordance with the installation instructions as follows
  - (a) For wet areas - Hitchins Pty Limited, 'Bathroom Waterproofing Application Procedures' (Dec 1998) and Hitchins Pty Limited, 'Application Procedures Formwal Traffigard Membrane System' (Dec. 1998).
  - (b) For roofing and decks, etc. - Hitchins Pty Limited, 'Application Procedures Formwal Traffigard Reinforced Liquid Deck and Roofing System' (1996)) and as specified for bituminous roofs in clause 3.4 of Standards Australia, CA55-1970 'Code of Recommended Practice for the Design and Installation of Bituminous Fabric Roofing', except that the requirements to use bituminous products are not applicable.

Note: These instructions are available on request from Hitchins Pty Limited, 21 Cowper Street, Granville, New South Wales 2142 (Facsimile 02 9682 7250).
2. The system is fully supported by the substrate, the surface of which is in a sound, clean and dry condition.
3. The membrane is installed only by installers trained and approved by Hitchins Pty Limited and where applicable, the installers are also licensed to do so by the relevant State regulatory authority.
4. The membrane is installed only when the atmospheric conditions are dry, to enable it to be fully bonded to the substrate.
 

Note: This is an advisory condition for the applicator as proper curing is dependent on the rate of evaporation.
5. The membrane is not used as a water-vapour barrier.

### Wet Areas:

1. Substrates are one or more of the following:
  - General wet areas - compressed fibre cement sheets, water-resistant plasterboard sheets (walls only), cement render, masonry, concrete, marine plywood, particleboard flooring.
  - Shower recesses walls - concrete, compressed fibre cement sheets, water-resistant plasterboard sheets, cement render or masonry.
  - Shower recess floors - concrete, compressed fibre cement sheets, marine plywood, wet-area particleboard flooring.
2. The membrane is allowed to cure before it is covered by a mortar bed or tiling.
 

Note: Generally, curing time is 24 hours. Curing time will be longer in cooler weather conditions, or in confined areas where limited airflow will retard the effective drying of the membrane.
3. The floor tiles in a shower recess are laid on a mortar bed which has a minimum slope to drainage outlets in accordance with local statutory requirements.
4. The floor waste, for substrates other than concrete, is fitted through a neat hole in the substrate, such that there is no more than a 5 mm gap between the pipe work and the substrate, and is fixed securely to the substrate with a flanged fitting.

### Roofing, decks etc:

1. The membrane is designed and installed to maintain waterproofing at protrusions and other details as specified for bituminous roofs in Standards Australia, CA55-1970 'Code of Recommended Practice for the Design and Installation of Bituminous Fabric Roofing, Clauses 3.6.1, 3.6.3, 3.6.5.5, and 3.6.6 to 3.6.8, except that the requirements to use bituminous products are not applicable.
 

Note The membrane is protected against potential damage by over coating with topcoats and glazes recommended by the applicant.
2. The substrate is fully supported and can be concrete, masonry, plywood flooring, wet-area particleboard flooring, fibre-reinforced cement sheeting, built up roofing, existing membranes and metal.

### Pools, fountains and plazas:

1. The system is installed in accordance with Hitchins Pty Limited specifications for each project.
2. The substrate is concrete, mortar, existing tile or stone.

## BUILDING CODE of AUSTRALIA

1996

In the opinion of ABSAC, the system described in this Technical Opinion and installed under the conditions listed herein will satisfy the performance requirements of Clauses FP1.4 and FP1.7 (Volume 1 - Class 2 to Class 9 buildings) and P2.2.2 and P2.4.1 (Volume 2 - Class 1 and Class 10 buildings Housing Provisions) of the Building Code of Australia 1996 including Amendments 1, 2, 3 and 4.

### Notes:

- (i) While the membrane provides the waterproof sealing requirements of the BCA, it is reliant on being supported by a suitable substrate and for wet areas is protected by an overlaying wearing surface.
- (ii) The inclusion of this clause with reference to the Building Code of Australia (BCA) is aimed at assisting those involved in the building permit/process to relate the Appraisal to their relevant regulations.
- (iii) Any changes made to the BCA will be reviewed during the term of validity of this Technical Opinion and, where necessary, any amendment required will be published in the annual CSIRO Directory of publications.

## RELATED INFORMATION

### VALIDITY OF THE OPINION

#### Condition:

This Technical Opinion applies only to the use of Formwal Traffigard 2000+ as described herein.

#### Withdrawal:

This Technical Opinion will be withdrawn or amended if ABSAC considers that a change in manufacturing quality renders the basis of appraisal invalid, or if reported field experience convinces ABSAC of unsatisfactory quality or performance.

#### Term of validity:

This Technical Opinion will lapse three years after the date of issue unless revalidation has been requested and granted (see back page).

### RELEVANT DOCUMENTS

Hitchins Pty Limited, 'Bathroom Waterproofing Application Procedures: (Dec 1998)  
Hitchins Pty Limited, 'Application Procedures Formwal Traffigard Reinforced Liquid Deck and Roofing System' (1996)

Hitchins Pty Limited, 'Application Procedures Formwal Traffigard Membrane System' (Dec.1998)  
Standards Australia, AS 3740-1994 'Waterproofing of wet areas within residential buildings' (Amdt 1 - September 1995)  
Standards Australia, CA55-1970 'Code of Recommended Practice for the Design and Installation of Bituminous Fabric Roofing'

### APPROVED OPINION EXTRACT

'Formwal Traffigard 2000+ Waterproof Membrane system as manufactured by Hitchins Pty Limited (ACN 074 433 275), Granville, New South Wales, is suitable for use as a waterproofing membrane in wet areas including shower recess bases (the membrane forms a shower tray), and associated floors and walls all of which are to be tiled and for waterproofing roofs, decks, plazas and car parks, when the conditions listed in ABSAC Technical Opinion 247 are fulfilled.

## APPRAISAL

### DESCRIPTION

This description is based on information supplied by the applicant.

#### General:

Formwal Traffigard 2000+ is a single component, ready mixed, acrylic polymer gel which cures to form a tough elastic waterproof and sealing membrane. It is available in a range of selected colours. When reinforced with fibreglass matting of 230 grams per square metre (g/m<sup>2</sup>), it provides a seamless membrane. It can be used over render, screeds, concrete, plaster, wall boards, fibre-reinforced cement sheeting, plywood flooring, particleboard, existing tile or stone. For application to metal surfaces, a zinc phosphate primer is used rather than diluted Traffigard. (Zinc chromates are not allowed to be used.)

#### Components:

'Formwal Traffigard 2000+'. This is a single pack, acrylic based coloured liquid compound which cures to form a flexible, tough, lightweight and durable waterproof membrane fully bonded to the substrate. The shelf life of 'Traffigard' is two (2) years if stored in a cool dry place in unopened containers. It is available in 20 litre containers. It is applied by brush or roller.

It can be used as a primer when diluted with water (maximum 20% water). It is applied as a primer at the rate of 9-10 m<sup>2</sup>/l.

**Traffiprime.** This is a single component, water based primer for new and/or unpainted surfaces. It is applied by brush or roller at a rate of 10 sq. metres per litre. It is touch dry in 1 hour at 20°C. Shelf life is two (2) years if stored in a cool dry place in unopened containers. Clean up is with water.

**Fibreglass Matting.** The applicant recommends that the fibreglass mat be chopped strand matting of 230 grams per square metre (g/m<sup>2</sup>). It is available in 1 m x 100 m rolls, and also a 200 mm x 100 m bandage.

#### Installation:

**General.** Installation instructions are provided by the applicant, in Hitchins Pty Limited, 'Bathroom Waterproofing Application Procedures' (Dec 1998), Hitchins Pty Limited, 'Application Procedures Formwal Traffigard Reinforced Liquid Deck and Roofing System' (1996) and Hitchins Pty Limited, 'Application Procedures Formwal Traffigard Membrane System' (Dec. 1998). These detail surface preparation, application rates, method of application, number of coats, drying time and clean up procedures.

#### **Preparation:**

All surfaces must be sound, clean and dry and free from dirt, dust and other contaminants. The applicant recommends that any cracks are sealed with 'Hitchins Crackpatch'. All surfaces need to be primed. The applicants 'Traffiprime' for this purpose..

#### **Wet Areas**

##### 1. Detailing and joint reinforcement:

A layer of Traffigard liquid is spread over all joints and cracks. Into this layer a 200 mm wide strip of reinforcement fabric is embedded.

After priming, the hob, wall/floor junctions and vertical corners are coated with the Traffigard liquid at a coverage rate of 2 m<sup>2</sup>/litre and then precut lengths of 200 mm reinforcement mesh are positioned into the wet Traffigard liquid and pressed completely into all corners.

A second coat is then applied, at a coverage rate of 3.5 m<sup>2</sup>/litre, over the mesh to fully embed it and allowed 24 hours to dry. A top (third) coat is applied at a coverage rate of 2 m<sup>2</sup>/litre over all reinforced areas to ensure that the fibreglass mat is entirely filled, with no pin holing.

At wall/floor coves, the fabric mesh is flashed 100 mm up the wall.

##### 2. Formwal Traffigard 2000+ and reinforcement:

All flat areas to be treated as for detailing and liquid material coverage to be at the rate of 0.7 m<sup>2</sup>/litre (1.5 litres per m<sup>2</sup>) for the total system.

The reinforcing fabric is pre-cut to size and immediately positioned into the wet Traffigard liquid, using a brush to embed the fabric and smooth out any wrinkles. This mesh is overlapped a minimum of 35 mm including overlaps onto joint reinforced areas.

For walls, 2 coats of unreinforced Traffigard are applied to the height of the tiles.

**Floor Waste.** The reinforcing fabric is turned down into the floor waste of drainage outlets a minimum of 40 mm or a flanged floor waste fitting is provided and the flange lapped with the reinforcing fabric.

The reinforcement is covered with a second coat of Traffigard liquid to fully embed the fabric.

When this coat is touch dry, a final coat (third coat) of liquid is applied to the entire surface to completely seal the membrane.

Traffigard Membrane should not be applied when the surface temperature is above 35°C and below 10°C.

##### 3. Flood testing:

Flood testing is carried out after a minimum of 24 hours dry/cure time.

##### 4. Covering:

Tiles can be directly applied to the cured membrane using a 2 part Latex adhesive.

##### 5. Clean up procedures:

Traffigard Membrane can be cleaned with water when wet.

#### **Roofing, decks, etc.**

The application procedures provide specific details for these applications including detailed diagrams.

## **DESIGN INFORMATION**

#### **General:**

The applicant states that Formwal Traffigard 2000+ Waterproofing Membrane System consists of a liquid applied acrylic gel, reinforced with fibreglass matting. It is used in wet areas, and on balconies, decks, plazas, pools and fountains which are to be tiled.

#### **Design:**

The applicant states that for pools, plazas and commercial wet area applications, each job has individual specifications and, if necessary, follow-up technical advice is available.

#### **Thickness:**

The applicant states that the final dry thickness where a single layer of reinforcing mat is used is nominally a minimum 0.6 mm. Thickness is greater where overlaps in the reinforcing matting are required.

#### **Durability:**

In the opinion of ABSAC, when used in wet areas the system is designed to have a life expectancy similar to that of the overlaying tile surface and for roofing applications the system should have a minimum life expectancy of 10 years.

## BASIS OF APPRAISAL

ABSAC has assessed the following aspects in undertaking this appraisal:

- (a) The system as fulfilling the requirements of Standards Australia, AS 3740-1989 'Waterproofing of wet areas within residential buildings' (Amdt 1 - September 1995).
- (b) The system as fulfilling the requirements of Standards Australia, CA 55-1970, 'Code of recommended practice for the design and installation of bituminous fabric roofing'
- (c) The applicant's installation instructions.
- (d) The physical properties of the material.
- (e) The ability of the system to cope with movements that occur between joints in the substrate and at junctions between one substrate material and another.

The following documents and inspections were used in carrying out the appraisal:

### *Manufacturer's Information:*

1. **Hitchins' Complete Building protection Systems Traffigard 2000+ Liquid roofing System':**  
This is a general product information sheet providing specifications and technical data.
2. **ACI Fibreglass, Frankston Road, Dandenong, Victoria 3175. Material Safety Data Sheet "Chopped Strand Mat" (March 1996):**  
This gives details of product identification, physical description/properties, health hazard information, storage and spillage procedures and special protection information.
3. **Traffigard Specifications:**  
No T-1 'Standard specification for use on concrete substrates' (November 1996)  
No T-2 'Standard specification for application to bituminous surfaces' (November 1996)  
No T-3 'Standard specifications for application to compressed fibre cement sheeting' (November 1996)  
No T-4 'Standard specification for application to structural grade plywood sheeting' (November 1996)  
No T-5 'Standard specifications for metal roof areas where initial cost is the primary factor' (November 1996).  
The fibreglass used in this system must be emulsion bonded fibreglass.
4. **Hitchins Pty Limited, 'Application procedures Formwal Traffigard membrane system' (Dec. 1998) and Hitchins Pty Limited, 'Application Procedures Formwal Traffigard Reinforced Liquid Deck and Roofing System' (1996):**  
These detail surface preparation, application rates, method of application, number of coats, drying time and clean up procedures and maintenance.

5. **Hitchins Pty Ltd, 21 Cowper Street, Granville, New South Wales 2142. Letter (5 August 1998):**  
This letter provides details of training of installers and advises that 'at this time setting up all procedures for manufacturing, etc. to meet the highest standards of quality control.'
6. **Hitchins Pty Ltd, 21 Cowper Street, Granville, New South Wales 2142. Correspondence (6 November):**  
This outlines details treatment of application to particleboard flooring.
7. **Hitchins Pty Ltd, 21 Cowper Street, Granville, New South Wales 2142. Correspondence (19 February 1999):**  
This confirms that the same formulation as used for the Myer Music Bowl is still used now.
8. **Hitchins Pty Ltd, 21 Cowper Street, Granville, New South Wales 2142. Correspondence (1999):**  
This provided information on Crackpatch including the Material Safety Data sheet of one of the components of the product.
9. **Hitchins Pty Ltd, 21 Cowper Street, Granville, New South Wales 2142. Correspondence (1999):**  
This provided information on Traffiprime including the Material Safety Data sheet.

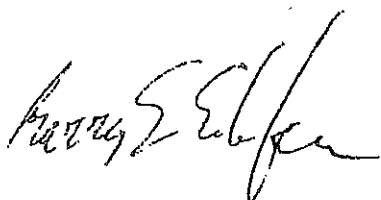
### *Reports:*

1. **CSIRO Division of Building, Construction and Engineering, Highett, Victoria BCE Doc 98/181(M), 'Testing of Hitchins Pty Limited, 'Traffigard' Membrane' (August 1998):**  
The report concludes that 'These results indicate that the material would be suitable for use as a membrane for wet areas.  
This reinforced membrane has a low elasticity and it may be necessary for it to be detailed as a low elasticity membrane. Low elasticity membranes require the bond breaker detailing which includes a backing rod.'
2. **Outdoor Exposure:**  
The applicant has advised that the product manufactured to the same specifications has been used on several structures for a period of years. One of these sites is the Myer Music Bowl in Melbourne. The formulation used on the Myer Music Bowl, applied in 1984, is the same as the current production.

Outdoor exposure inspections, and history of completed work is the only reliable means of obtaining information about the durability of membrane materials, in terms of continuing performance.

**Inspections:**

Inspections of installations have been undertaken by representatives of ABSAC and found to be satisfactory.



B. L. Schafer  
Appraisal Officer



K.G. Deacon  
Chairman ABSAC





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**H. RELATED DOCUMENTS****J. OTHER/OPTIONAL INFORMATION****14. ABSTRACT (ABSAC Approved Opinion Extract)**

'Formwal Traffigard 2000+ Waterproof Membrane system as manufactured by Hitchins Pty Limited (ACN 074 433 275), Granville, New South Wales, is suitable for use as a waterproofing membrane in wet areas including shower recess bases (the membrane forms a shower tray), and associated floors and walls all of which are to be tiled and for waterproofing roofs, decks, plazas and carparks, when the conditions listed in ABSAC Technical Opinion 247 are fulfilled.

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BCE Doc 98/181(M)

Testing of Hitchins Pty Limited  
'Traffigard' Membrane

by B.L. Schafer, B. Budgen and A. Bradbury

In Confidence to

Hitchins Pty Limited

August 1998  
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CSIRO BUILDING, CONSTRUCTION AND ENGINEERING



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# Hitchins Pty Limited 'Traffigard' membrane

## 1. INTRODUCTION

The following tests were performed on samples of 'Traffigard' membrane. Sheets with reinforcement were supplied by the applicant.

The tests are those used in appraisal of membranes for use in wet areas. Testing performed included physical properties of gravimetric thickness and mass per unit area. Tensile strength and elongation at break testing was undertaken on the membrane to find out its tensile strength and elongation at break properties before and after immersion in water, and solutions of bleach and detergent. Hardness and loss on heat ageing, water absorption, loss on heating and water vapour transmission tests were also undertaken.

## 2. TEST

### 2.1 Mass per unit area and gravimetric thickness

Australian Standard, AS 2324-1979 'PVC Film and sheeting (flexible, unsupported, calendered)' Appendix D 'Method for determining gravimetric thickness and mass per unit area'. Results are shown below in Table 1.

Table 1. Mass per unit area, density and gravimetric thickness

Sample	Mass per unit area g/m <sup>2</sup>	Density g/cm <sup>3</sup>	Gravimetric thickness mm
1	1056	1.50	0.71
2	1029	1.55	0.66
3	1049	1.55	0.68
4	1009	1.51	0.67
5	1063	1.53	0.70
Average	1041	1.53	0.68

### 2.2 Tensile strength and elongation at break

AS 1145-1989 'Determination of tensile properties of plastics materials'. Type 2 specimens

#### Sample Preparation and Testing

Three thickness measurements were taken of the narrow section of each sample and averaged. Samples were immersed in solutions of deionized water, 30% teepol, 2% sodium hypochlorite. Samples were immersed for 7 days, 28 days and 56 days. At each of these intervals, three samples were tested from each solution. Five control (unexposed) samples were also tested and three samples after 14 days ultra-violet light exposure.

The samples were tested on a Lloyd Material Testing Machine. The samples were tested in tension until they broke with the following parameters used in the testing of each sample:

Load Cell Rating      100 Newtons  
Load Cell Class:      2  
Extension reading:    Internal  
Gauge length:        33.00 mm  
Break Mode:            Automatic  
Sample thickness:     Varied with each sample, 1 - 2 mm  
Speed (with mesh)    20 mm/min & 10 mm/min  
Sample width          6.00 mm

Tensile Strength, Elongation at Break, Break Stress, Break Load, Break Extension, Maximum Load and Maximum Extension were recorded for each sample. However, this report only gives the results for Tensile Strength and Elongation at Break as shown in Table 2.

Table 1. Tensile Strength and Elongation at Break before and after conditioning.

	Tensile Strength MPa	Ext. at Break %	Tensile Strength MPa	Ext. at Break %	Tensile Strength MPa	Ext. at Break %
<b>Conditioning</b>	<b>Control</b>		<b>UV Exposure</b>			
	22.76	10.3				
	35.59	8.6				
	38.45	11.1	40.60	7.3		
	17.01	5.1	53.75	9.7		
	31.88	7.7	48.04	7.5		
<b>Average</b>	<b>29.14</b>	<b>8.6</b>	<b>47.46</b>	<b>8.2</b>		
<b>Conditioning</b>	<b>Water</b>		<b>Detergent</b>		<b>Bleach</b>	
<b>Time ↓</b>						
7 Days	9.48	19.5	7.42	20.6	1.43	55.5
	8.73	17.3	4.10	16.1	1.33	54.0
	7.98	29.1	3.97	29.8	0.82	66.0
<b>Average</b>	<b>8.73</b>	<b>22.0</b>	<b>5.16</b>	<b>22.2</b>	<b>1.19</b>	<b>58.5</b>
28 Days	8.15	15.1	1.18	20.2	0.71	44.9
	10.67	23.9	1.58	14.9	0.95	54.5
	8.67	7.5	0.87	27.3	0.79	56.5
<b>Average</b>	<b>9.16</b>	<b>15.5</b>	<b>1.21</b>	<b>20.8</b>	<b>0.82</b>	<b>52.0</b>
56 Days	17.59	7.8	1.81	43.3	0.93	44.8
	8.35	6.0	1.94	28.0	0.92	29.8
	11.11	-	1.83	50.0	1.28	53.8
<b>Average</b>	<b>12.35</b>	<b>6.9</b>	<b>1.86</b>	<b>40.4</b>	<b>1.04</b>	<b>42.8</b>

Graphs 1 and 2 show the variation of tensile strength and elongation at break with immersion.

### 2.3 Tensile strength and elongation at break after UV exposure

Three samples were exposed to ultraviolet light in accordance with AS 2433-1994 'Plastics - Method for exposure to ultraviolet lamps'.

The samples were then tested as above with the results as in Table 2 above.

### 2.4 Hardness (Shore A) and Loss on heat ageing (%)

AS 1526-1974 'One-part polysulphide-based sealing compounds for the building industry' Appendix E 'Hardness properties and loss of mass after heat ageing'.

The samples comprised several layers of the membrane to achieve the minimum thickness required by the standard for testing. However, due to a limited amount of membrane, the dimensions of the samples were less than that required in the standard. Three readings were taken on each of two specimens, both before and after heat ageing in a temperature controlled oven at 80 °C for 14 days, in accordance with Appendix E. The six readings were averaged in accordance with AS 1526.

Initial hardness	68
Hardness after heat ageing	59
% loss of mass after heat ageing	2.9

## 2.5 Loss on heating

Testing based on AS A121-1960 'Bituminous felt roofing' Appendix J 'Loss and behaviour on heating'. Two samples approximately 100 mm x 100 mm were oven dried in a Qualtex Oven for two hours at 80°C.

The loss on heating for 2 hours was 0.79% and 0.76% (average 0.78%). There was no observable difference in the material over this period.

## 2.6 Water absorption

This was in accordance AS 3558.1-1989 'Methods of testing plastics and composite materials for sanitary plumbing fixtures'

Method 1. Determination of water absorption characteristics.

% water absorption =  $(m_2 - m_1)/m_1 * 100$

	2.7
	3.5
	4.3
<u>Average</u>	<u>3.5</u>

## 2.7 Water vapour transmission

The desiccant method according to ASTM E96-90 'Standard Test methods for water vapor transmission of materials' was used. The membrane was attached to the cup with preserving wax. The conditions of test were 23 °C and 50% relative humidity. The area of the membrane transmitting moisture was 7381 mm<sup>2</sup>.

The water vapour transmission rate was 5.7 g/24h/m<sup>2</sup>.


## 3. CONCLUSION

These results indicate that the material would be suitable for use as a membrane for wet areas.

This reinforced membrane has a low elasticity and it may be necessary for it to be detailed as a low elasticity membrane. Low elasticity membranes require the bond breaker detailing which includes a backing rod.



B.L. Schafer



B. Budgen

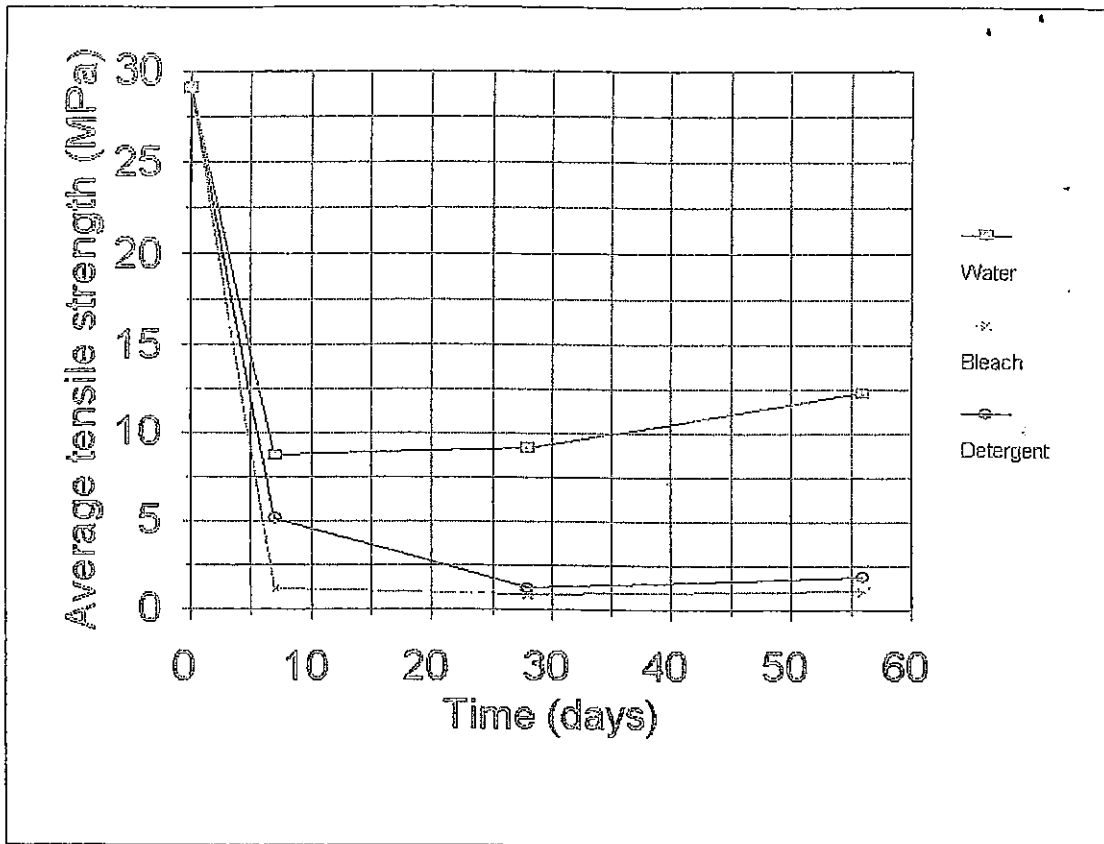


A. Bradbury

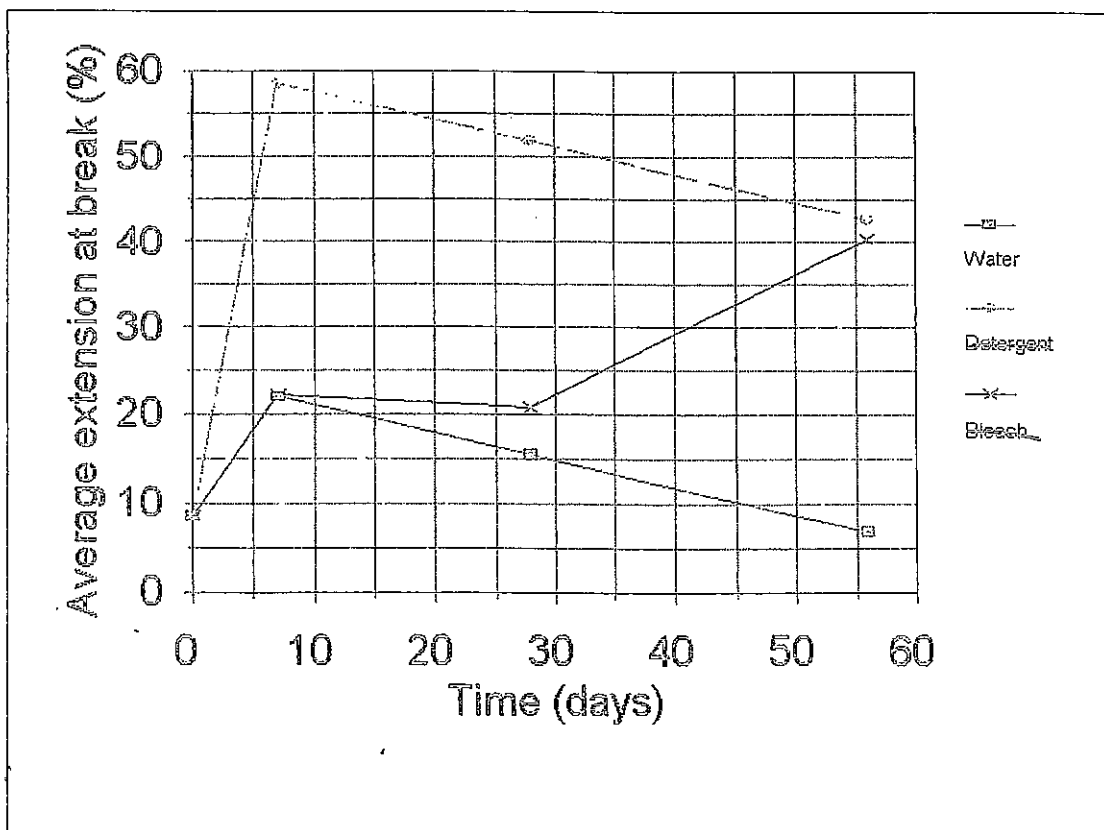
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Date



Graph 1. Variation of average tensile strength with duration of immersion



*Bleach*  
*detergent*

Graph 2. Variation of average extension at break with duration of immersion



# MEMBRANE Test Results

Date:

1. Manufacturer		HITCHINS PTY LTD P.O. Box 821 GRANVILLE NSW 2142		
2. Distributor		HITCHINS PTY LTD		
3. Product Name		Formwal TRAFFIGARD		
4. Product Description		Reinforced acrylic Membrane system 300 csm fibreglass		
5. Thickness	Test Method	ASTM D751 / D 412 / D 3022		
	Result	0.6 - 1.0 mm		
6. Tensile Strength	Test Method	ASTM D 2370 - 68		
	Result	211.3 N (unreinforced)		
7. Ultimate Elongation	Test Method	ASTM D 2370 - 68	AS 1145 - 72	
	Result	740 % (unreinforced) 21.12 N (reinforced)		
8. Tear Resistance	Test Method	ASTM D 751 / D524 / D 1004		
	Result	N.A.		
9. Water Vapour Transmission (Permeability)	Test Method	ASTM D1855-72		
	Result	5.123 gm / m <sup>2</sup> / 24 hours		
10. Water Absorption	Test Method	ASTM D 471 / D 2188		
	Result			
11. Dynamic Impact (Puncturing)	Test Method	ASTM 2784 - 83		
	Result			
12. Lap Joint Strength	Test Method	ASTM D 751 / D 412 / D 413		
	Result	N.A. seamless		
13. Dimensional Stability	Test Method	ASTM D 570 / D 1204		
	Result	N.A.		
14. Flexibility	Test Method	ASTM D 1757		
	Result	Passes 3mm Mandrel		
15. Low Temperature Flexibility	Test Method	ASTM D 2185/D 2187/ D 746		
	Result			
16. Heat Aging	Test Method	ASTM D 573		
	Result			
17. Accelerated Weathering	Test Method	ASTM D 882		
	Result	2000 hours / no defects		
18. Density	Test Method	AS 2341 - 7		
	Result			

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Testing of Hitchins Pty Limited  
'Traffigard' Membrane

by B.L. Schafer, B. Budgen and A. Bradbury

In Confidence to

Hitchins Pty Limited

August 1998  
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CSIRO BUILDING, CONSTRUCTION AND ENGINEERING



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# Hitchins Pty Limited 'Traffigard' membrane

## 1. INTRODUCTION

The following tests were performed on samples of 'Traffigard' membrane. Sheets with reinforcement were supplied by the applicant.

The tests are those used in appraisal of membranes for use in wet areas. Testing performed included physical properties of gravimetric thickness and mass per unit area. Tensile strength and elongation at break testing was undertaken on the membrane to find out its tensile strength and elongation at break properties before and after immersion in water, and solutions of bleach and detergent. Hardness and loss on heat ageing, water absorption, loss on heating and water vapour transmission tests were also undertaken.

## 2. TEST

### 2.1 Mass per unit area and gravimetric thickness

Australian Standard, AS 2324-1979 'PVC Film and sheeting (flexible, unsupported, calendered)' Appendix D 'Method for determining gravimetric thickness and mass per unit area'. Results are shown below in Table 1.

Table 1. Mass per unit area, density and gravimetric thickness

Sample	Mass per unit area g/m <sup>2</sup>	Density g/cm <sup>3</sup>	Gravimetric thickness mm
1	1056	1.50	0.71
2	1029	1.55	0.66
3	1049	1.55	0.68
4	1009	1.51	0.67
5	1063	1.53	0.70
Average	1041	1.53	0.68

### 2.2 Tensile strength and elongation at break

AS 1145-1989 'Determination of tensile properties of plastics materials'. Type 2 specimens

#### Sample Preparation and Testing

Three thickness measurements were taken of the narrow section of each sample and averaged. Samples were immersed in solutions of deionized water, 30% teepol, 2% sodium hypochlorite. Samples were immersed for 7 days, 28 days and 56 days. At each of these intervals, three samples were tested from each solution. Five control (unexposed) samples were also tested and three samples after 14 days ultra-violet light exposure.

The samples were tested on a Lloyd Material Testing Machine. The samples were tested in tension until they broke with the following parameters used in the testing of each sample:

Load Cell Rating	100 Newtons
Load Cell Class:	2
Extension reading:	Internal
Gauge length:	33.00 mm
Break Mode:	Automatic
Sample thickness:	Varied with each sample, 1 - 2 mm
Speed (with mesh)	20 mm/min & 10 mm/min
Sample width	6.00 mm

Tensile Strength, Elongation at Break, Break Stress, Break Load, Break Extension, Maximum Load and Maximum Extension were recorded for each sample. However, this report only gives the results for Tensile Strength and Elongation at Break as shown in Table 2.

Table 1. Tensile Strength and Elongation at Break before and after conditioning.

	Tensile Strength MPa	Ext. at Break %	Tensile Strength MPa	Ext. at Break %	Tensile Strength MPa	Ext. at Break %
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Graphs 1 and 2 show the variation of tensile strength and elongation at break with immersion.

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3.5

4.3

Average 3.5

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B.L. Schafer



B. Budgen



A. Bradbury

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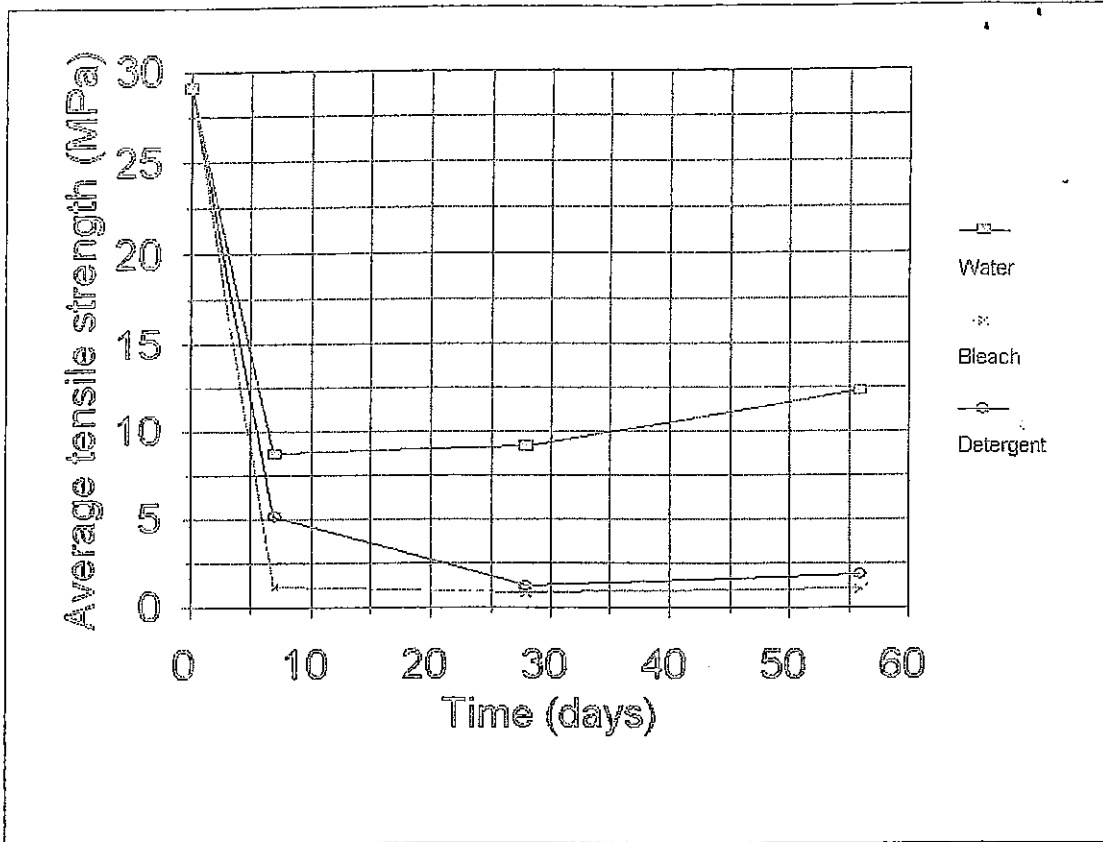
B. Budgen

A. Bradbury

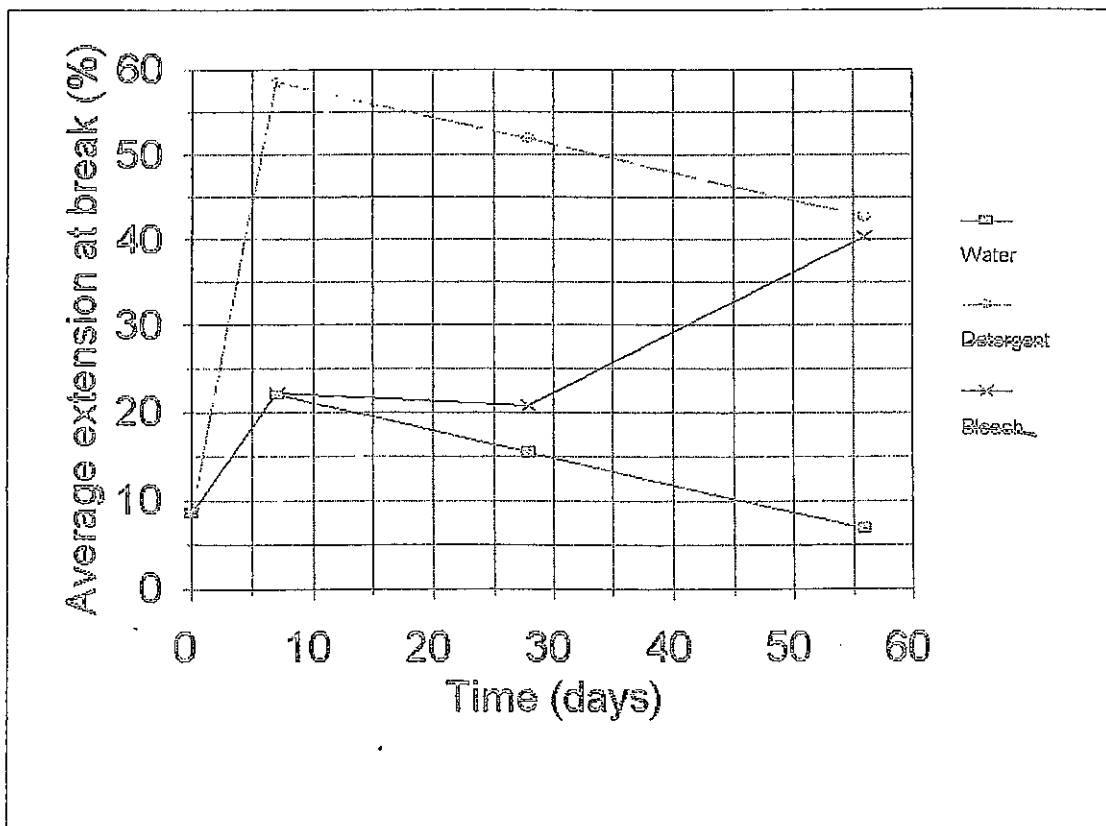
Officers conducting test

7/8/98

Date



Graph 1. Variation of average tensile strength with duration of immersion



*Bleach*  
*Detergent*

Graph 2. Variation of average extension at break with duration of immersion

## MEMBRANE Test Results

Date:

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2. Distributor		HITCHINS PTY LTD		
3. Product Name		Formval TRAFFICARD		
4. Product Description	Top Surface Reinforcement	Reinforced acrylic Membrane system 300 csm fibre-glass		
5. Thickness	Test Method	ASTM D751 / D 412 / D 3024		
	Result	0.6 - 1.0 mm		
6. Tensile Strength	Test Method	ASTM D 2870 - C8		
	Result	211.3 N (unreinforced)		
7. Ultimate Elongation	Test Method	ASTM D 2870 - C8	AS 1145 - 72	
	Result	740 % (unreinforced) 21.12 N (reinforced)		
8. Tear Resistance	Test Method	ASTM D 751 / D524 / D 1004		
	Result	N.A.		
9. Water Vapour Transmission (Permeability)	Test Method	ASTM D1855-72		
	Result	5.123 gm / m <sup>2</sup> / 24 hours		
10. Water Absorption	Test Method	ASTM D 471 / D 2188		
	Result			
11. Dynamic Impact (Puncturing)	Test Method	ASTM 2784 - D8		
	Result			
12. Lap Joint Strength	Test Method	ASTM D 751 / D 412 / D 413		
	Result	N.A. seamless		
13. Dimensional Stability	Test Method	ASTM D 570 / D 1204		
	Result	N.A.		
14. Flexibility	Test Method	ASTM D 1737		
	Result	Passes 3mm Mondrel		
15. Low Temperature Flexibility	Test Method	ASTM D 2188 / D 2187 / D 745		
	Result			
16. Heat Aging	Test Method	ASTM D 578		
	Result			
17. Accelerated Weathering	Test Method	ASTM D 892		
	Result	2000 hours / no defects		
18. Density	Test Method	AS 2341 - 7		
	Result			