

# SHIRLEY HIGH PERFORMANCE MATERIALS CONFIDENTIAL TEST REPORT

Date: 3 March 2003  
Our Ref : 12017/HPM005/LP  
Your Ref : Akwill Company Ltd

Page 1 of 7

Client: Coconut Enterprises  
21 Webber Street  
London  
SE1 8QW

Job Title: Tests on Horticultural Textiles

Client's order no:

Date of receipt: 29<sup>th</sup> October 2002

Description of sample(s): Two samples of cocunut fibre products, identified as "Crop Protection Textile Code: HCOF" and "Turf mat Code: HCOTF", were received for testing

Work requested: We were asked to make the following tests:

Crop Protection Textile

Mass per unit area (dry & wet) ASTM D5261  
Thickness (dry & wet) ASTM D5199  
Tensile strength (dry & wet) BS EN ISO 10319  
Water absorption ASTM D1117

Turf Mat

Mass per unit area (dry & wet) ASTM D5261  
Thickness (dry & wet) ASTM D5199  
Pore size EN ISO 12956  
Water permeability EN ISO 11058  
In-plane water flow EN ISO 12958  
Water absorption ASTM D1117

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together with a copy of our standard terms of business (see <http://www.bttg.co.uk>)

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Date: 3 March 2003  
Our Ref : 12017/HPM005/LP  
Your Ref : Akwill Company Ltd

Page 2 of 7

Coconut Enterprises

## LABORATORY WORK

### Conditioning

Dry tests were made in the Standard Atmosphere ( $65 \pm 2\%$  RH at  $20 \pm 2^\circ\text{C}$ ) the samples having been freely and continuously exposed to that atmosphere for at least 24 hours prior to testing.

Wet tests were made after submerging the test specimens in distilled water for 1 hour and allowed to drain vertically until specimens stopped dripping.

### Mass per Unit Area

The tests were made following the ASTM D5261-92 procedure "Standard Test Method for Measuring Mass per Unit Area of Geotextiles"

For each sample, in each condition, five specimens, each  $100 \text{ cm}^2$ , were cut from the sample and weighed. Weight per unit area was calculated.

### Thickness

The tests were made following the ASTM D5199 procedure, "Measuring nominal thickness of geotextiles and geomembranes."

The tests were made using a circular presser foot (area  $25 \text{ cm}^2$ ) and a pressure of 2 kPa, the thickness reading being taken 5 seconds after application of pressure.

For each sample, in each condition, ten specimens were tested.

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# SHIRLEY HIGH PERFORMANCE MATERIALS

## CONFIDENTIAL TEST REPORT

Date: 3 March 2003  
Our Ref : 12017/HPM005/LP  
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Page 3 of 7

Coconut Enterprises

### Tensile Strength

The tests were made following the BS EN ISO 10319 - 1996 procedure, "Geotextiles - Wide width tensile test".

Five warp-way and five weft-way specimens were prepared, each with an effective width of 200 mm and long enough to enable a gauge length of 60 mm to be used.

The tests were made on a Testometric 200 kN CRE machine fitted with compressive jaws, set 100 mm apart and operating at a strain rate of 20 % per minute.

The extension was measured from reference marks on the specimens, which were situated on the specimen symmetry axis, parallel to the applied load, and separated by a distance of 60 mm (30 mm on each side of the specimen centre), using a Wallace non contact extensometer and a pretension of 1% of maximum load.

### Absorbency Time and Absorptive Capacity

The tests were made following the principles of test described in ASTM D1117-80.

Absorbency Time measures the time required for the complete wetting of a specimen strip which has been loosely rolled into a cylindrical wire basket and dropped on to the surface of the water from a height of 25mm. For each sample five specimens were tested in the M-Way. Each specimen was 76mm in length and of sufficient width to provide a specimen weight of  $5 \pm 0.1$ g. Specimens were tested in distilled water at 20 °C. The time taken for the basket to completely sink below the surface of the liquid was recorded.

Absorptive Capacity provides a measure of the amount of liquid held within a test specimen after specified times of immersion and drainage. The specimens used to determine absorbency time were also used to determine absorptive capacity. After determining absorbency time specimens were left submerged for a further 10 seconds before removing specimen and basket and allowing to drain for 10seconds prior to weighing. The liquid absorptive capacity is given as a percentage of the original mass of the test specimen.

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# SHIRLEY HIGH PERFORMANCE MATERIALS

## CONFIDENTIAL TEST REPORT

Date: 3 March 2003  
Our Ref : 12017/HPM005/LP  
Your Ref : Akwill Company Ltd

Page 4 of 7

### Coconut Enterprises

#### Pore Size (Wet Sieving)

The tests were made following BS EN ISO 12956: 1999 "Geotextiles and geotextile related products: Determination of the Characteristic Opening Size".

The characteristic opening size is obtained by determining the particle size distribution of a graded granular material which is washed through a single layer of geotextile (or related product) using the geotextile as a sieve.

The specimens for test are first weighed before being left to saturate in water for at least 12 hours at laboratory temperature prior to testing.

For each sieving  $7 \pm 0.1 \text{ kg/m}^2$  of granular material is shaken for 10 minutes on a test specimen clamped in place on a frame, 200 mm in diameter. The water spray, uniform over the whole specimen and maintained during the whole sieving operation, is adjusted to ensure that the soil particles are completely wetted but with no standing water on the specimen. The amplitude of the shaker is set at 1.5mm.

The granular material passing through the specimen is collected and dried. The specimen together with the retained granular material is also dried to ensure that the combined mass of the retained and passed granular material does not deviate by more than 1% from the initial dry mass.

This wet sieving procedure is carried out on three of the five specimens. If any of the masses passing through the geotextile deviate from the average by more than 25% the two remaining specimens are tested. Or, if the total amount passed through the three specimens is less than the amount required for sieving according to ISO 2591-1 then the two remaining specimens are tested.

The granular material passing through the specimens is combined and a particle size distribution carried out following the guidance given in ISO 2591-1.

#### Permeability

The tests were made following the BS EN ISO 11058: 1999 procedure, "Geotextiles and geotextile related products, Determination of water permeability characteristics normal to the plane, without load, "measuring the velocity index ( $V_{1H50}$ ) only at a head loss of 50 mm.

The tests were made using a test area of  $1960\text{mm}^2$ , with water fed from a stilling tank maintained at a temperature of  $20^{\circ}\text{C}$ .

Five specimens were tested.

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# SHIRLEY HIGH PERFORMANCE MATERIALS CONFIDENTIAL TEST REPORT

Date: 3 March 2003  
Our Ref : 12017/HPM005/LP  
Your Ref : Akwill Company Ltd

Page 5 of 7

## Coconut Enterprises

### In Plane Water flow

The tests were made following the BS EN ISO 12958:1999 procedure, "Geotextiles and geotextile related products - Determination of water flow capacity in their plane", using the following conditions:

Hydraulic Gradient	-	0.5
Pressure	-	2kPa
Contact Surfaces	-	Soft foam, hard contact
Water type	-	Still tank
Water temperature	-	20°C
Specimen size	-	200mm x 300mm
Number of specimens	-	3 in each direction

The mean results obtained in all tests are shown in the following test certificates.

Graphs showing particle size distribution of the initial and combined passed granular material used in the wet sieving tests (FIGS 1 - 2) are also enclosed.

This report confirms all information previously given by fax dated 10<sup>th</sup> December 2002.

Reported by: .....

Miss L Peel  
Operational Head

Countersigned by: .....

Mrs C Austin  
Business Centre Manager

Enquiries concerning this report should be addressed to Customer Services.

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 Our Ref : 12017/HPM005/LP  
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Page 6 of 7

Coconut Enterprises

### Sample: Crop Protection Textile Code: HCOF

Test	Method		SD	CV %
Mass per unit area (g/m <sup>2</sup> ) (dry)	ASTM D5261	673.5	140.34	20.84
Mass per unit area (g/m <sup>2</sup> ) (wet)		2307.5	572.77	24.82
Thickness (mm) (dry)	ASTM D5199	9.73	1.70	17.48
Thickness (mm) (wet)		10.43	1.47	14.07
Tensile Strength (dry)	BS EN ISO 10319			
Assumed M-Way Tensile Strength (kN/m)		6.24	0.71	11.37
Assumed M-Way Extension % at max. load		18.8	7.36	39.14
Assumed X-Way Tensile Strength (kN/m)		4.59	1.70	37.12
Assumed X-Way Extension % at max. load		14.8	3.70	24.98
Tensile Strength (wet)				
Assumed M-Way Tensile Strength (kN/m)		3.85	1.91	49.59
Assumed M-Way Extension % at max. load		13.7	0.76	5.53
Assumed X-Way Tensile Strength (kN/m)		3.65	0.75	20.65
Assumed X-Way Extension % at max. load		22.1	5.69	25.78
Water absorption	ASTM D1117			
Absorbency time (seconds)		1310		
Absorptive capacity (% of own weight)		264.6		

Dry tests were made in the conditioned atmosphere and test specimens had been left to condition for a minimum of 24hours prior to testing.

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Date: 3 March 2003  
Our Ref : 12017/HPM005/LP  
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Page 7 of 7

Coconut Enterprises

Sample: Turf mat Code: HCOTF

Test	Method		SD	CV %
Mass per unit area (g/m <sup>2</sup> ) (dry)	ASTM D5261	2293.5	359.88	15.69
Mass per unit area (g/m <sup>2</sup> ) (wet)		5354.5	824.29	15.39
Thickness (mm) (dry)	ASTM D5199	17.64	2.67	15.11
Thickness (mm) (wet)		18.70	2.99	16.00
Pore size	EN ISO 12956	0 <sub>90</sub> = >560µm		
Water Permeability	EN ISO 11058			
Velocity Index (VI <sub>H50</sub> ) ms <sup>-1</sup>		Mean	0.129	
		Minimum	0.089	
		Maximum	0.165	
Assumed M-Way In-Plane water flow	EN ISO 12958			
Foam contact At HG 0.5 Pressure 2kPa (l/s/m)		1.038		
Hard contact At HG 0.5 Pressure 2kPa (l/s/m)		2.237		
Water absorption	ASTM D1117			
Absorbency time (seconds)		131, 494		
Absorptive capacity (% of own weight)		169.1		

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