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Testing. Advising. Assuring.

**EVALUATION OF AN ACRYLIC MODIFIED SHEET MATERIAL
FOR WATER ABSORPTION
IN ACCORDANCE WITH ASTM D570 - 98**

A Report to:

Brilliant Solid Surfaces
JBD (HK) Products Ltd.
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Attention:

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Proposal No.:

12-006-04544

Report No.:

12-06-M0285
3 pages

Date:

October 26, 2012

1.0 INTRODUCTION

At the request of *Brilliant Solid Surfaces*, Exova was retained to evaluate an acrylic modified sheet material for water absorption in accordance with ASTM D570 – 98.

Upon receipt the sample was assigned the following Exova sample number:

Client Sample Identification	Exova Sample No.
Acrylic modified sheet material 50.8 mm dia. x 3.2 mm thick (nominal) – 3 pieces	12-06-M0285

2.0 PROCEDURE

The sample was tested in accordance with ASTM D570 – 98 using the following parameters:

Test Specimen: Section 5.1: disc, 50.8 mm dia. x 3.2 mm thick (nominal)

Number of Specimens: Three (3)

Conditioning: 24 hours at $50 \pm 3^{\circ}\text{C}$
 Digital Timer, MII# B10864
 Circulating air oven; MII# A14218
 Thermocouple; MII# B10864
 Digital scale; MII# B05590
 Digital Callipers, MII# B10643
 2012-10-03 10:30 AM to 2012-10-04 10:30 AM

Immersion Procedure: Repeated Immersion (Section 7.3)
 2 hour immersion, weighing, 24 hour immersion, final weighing
 $23 \pm 1^{\circ}\text{C}$ DI water
 Digital Timer, MII# B10864
 Environmental Chamber; MII# A11354
 Digital scale; MII# B05590
 2012-10-03 12:00 PM to 2012-10-04 12:00 PM

3.0 RESULTS

A summary of results is presented in Table 1 and Table 2. SI units are the primary units of measure.

Table 1 – Recorded Values ASTM D570 - 98 Exova Sample No.: 12-06-M0285							
No.	Dia., mm	Thickness, mm	Weight, g				
			Received	Cond.	2 h Water	24 h Water	Recond.
1	51.18	3.14	11.0117	11.0056	11.0083	11.0147	10.9994
2	51.14	3.14	11.0456	11.0392	11.0471	11.0153	11.03271
3	51.02	3.11	11.0133	11.0066	11.0153	11.0153	11.0006

Table 2 – Results ASTM D570 - 98 Exova Sample No.: 12-06-M0285					
Specimen No.	Observations	2 h Water Absorption, %	24 h Water Absorption, %	Soluble Matter Loss, %	Water Absorbed ¹ , %
1	None	0.02	0.08	0.06	0.14
2	None	0.01	0.07	0.06	0.13
3	None	0.03	0.08	0.05	0.13
Average		0.02	0.08	0.06	0.13

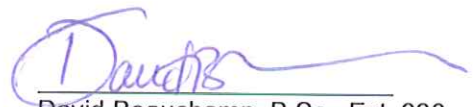
4.0 CONCLUSION

The acrylic modified sheet material submitted by *Brilliant Solid Surfaces* has an average measured 24 hour water absorption of 0.13% when tested as described in this report.

Reported by:


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Approved by:


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¹ Water absorbed is the sum of 24 h water absorption and soluble matter loss.

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Mechanical Testing of Acrylic Modified Sheet Material

A Report to:

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Client Reference:

Proposal No.: 12-006-04544
Work Order: 513758

Report No.:

12-005-28531-1
8 Pages

Date:

October 5, 2012

1.0 INTRODUCTION

Brilliant Solid Surfaces submitted one type of acrylic modified sheet material to be tested for mechanical and physical properties.

The material was received, logged in and assigned the following Sample Number:

Brilliant Solid Surfaces Identification	Exova Sample Number
5520 2012-5-15 20120515 (12-06-M0285) Acrylic modified sheet material	12-28531-072217

2.0 PROCEDURE AND RESULTS

The specimens were conditioned to $23 \pm 2^{\circ}\text{C}$ and $50 \pm 5\%$ relative humidity for a minimum of 40 hours prior to being tested under the same conditions.

2.1 Tensile Properties

Tensile properties were determined in accordance with ASTM D 638-10, "Tensile Properties of Plastics". Type III specimens were prepared using a "Tensil-Kut" router. Self-tightening grips with coarse serrated facings were used to pull the specimens. The speed of testing was 5 mm per minute.

The equipment used for the testing follows:

Instrument	Calibration Status (Valid Until Date)
Instron 3367 tester (MII #B13544)	2013-08-14
30 kN load cell (MII #B13543)	2013-08-14
Extensometer (MII #A11490)	2013-11-27
Digital micrometer (MII #B02932A)	2012-12-19
Digital caliper (MII #B06885)	2013-01-12
Conditioning room (MII #B13550)	2013-08-17

Tensile property test values are shown in Table I on page 3.

TABLE I
Tensile Properties

Specimen Number	Width (mm)	Thickness (mm)	Tensile Strength (MPa)	Elongation at Break (%)	Modulus of Elasticity (GPa)
1	19.1	12.7	31.2	0.388	9.72
2	19.0	12.6	33.5	0.435	9.63
3	19.0	12.6	31.0	0.381	9.35
4	19.0	12.6	29.5	0.344	9.91
5	19.0	12.6	31.6	0.387	9.94
Mean Value	19.0	12.6	31.4	0.387	9.71
Standard Deviation	0.054	0.068	1.4	0.032	0.24

2.2 Flexural Properties

Flexural properties were measured in accordance with Procedure A of ASTM D 790-10, "Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials". A three-point-bend fixture with a support span of 204 mm was used (16:1 span-to-depth ratio) to test the specimens at a speed of 5.45 mm per minute. The loading rod and support rods had 25.4 mm diameter.

The equipment used for the testing follows:

Instrument	Calibration Status (Valid Until Date)
Instron tester (MII #A03921)	2012-11-15
100 kN load cell (MII #A03922)	2012-11-14
Digital caliper (MII #B06885)	2013-01-12
Digital micrometer (MII #B02932A)	2012-12-19
Conditioning room (MII #B13550)	2013-08-17

Flexural property test values are shown in Table II on page 4.

TABLE II
Flexural Properties

Specimen Number	Width (mm)	Thickness (mm)	Flexural Strength (MPa)	Flexural Modulus (GPa)
1	50.7	12.7	44.4	8.09
2	51.0	12.7	41.0	7.32
3	50.8	12.7	42.9	7.65
4	50.8	12.8	40.9	7.65
5	50.8	12.8	46.4	7.99
Mean Value	50.8	12.7	43.1	7.74
Standard Deviation	0.12	0.030	2.3	0.31

2.3 Izod Impact Resistance

Izod impact strength was measured in accordance with ASTM D256–10, "Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics". The specimens were notched prior to testing.

The equipment used for the testing is listed below:

Instrument	Calibration Status (Valid Until Date)
TMI tester (MII #B10718)	2014-04-16
2 lb pendulum (MII #B05455))	2014-04-16
Notching machine (MII #A02697)	2014-04-16
Digital caliper (MII #B01347)	2012-12-19
Digital micrometer (MII #B02932)	2012-12-19
Conditioning room (MII #B13550)	2013-08-17

Test results are presented in Table III on page 5.

TABLE III
Notched Izod Impact Resistance

Specimen Number	Width (in)	Thickness (in)	Izod Impact Resistance (ft-lb/in)	Izod Impact Strength (ft-lb/in ²)	Izod Impact Resistance (J/m)	Izod Impact Strength (kJ/m ²)	Mode of Failure
1	0.494	0.402	0.319	0.794	17.0	1.67	Complete
2	0.496	0.398	0.330	0.829	17.6	1.74	Complete
3	0.494	0.399	0.323	0.810	17.2	1.70	Complete
4	0.494	0.404	0.312	0.772	16.7	1.62	Complete
5	0.494	0.404	0.319	0.790	17.0	1.66	Complete
Mean Value	0.494	0.402	0.321	0.799	17.1	1.68	--
Standard Deviation	0.00079	0.0030	0.0066	0.022	0.40	0.05	--

2.4 Coefficient of Linear Thermal Expansion

Testing was conducted in accordance with ASTM D 696-08, "Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30°C and 30°C with a Vitreous Silica Dilatometer".

The equipment used for testing was as follows:

Instrument	Calibration Status (Valid Until Date)
Dilatometer (MII #B06164)	N/A
Digital Displacement Indicator (MII #B066790)	2013-01-13
Digital Caliper (MII #B06885)	2013-01-12
Digital Thermometer (MII #B03890)	2013-03-27
Thermocouple Wire (MII #B13425)	2013-05-04
Stopwatch (MII #B05442)	2012-05-15
Conditioning room (MII #B13550)	2013-08-17

Test results are presented in Table IV on page 6.

TABLE IV
Coefficient of Linear Thermal Expansion

Testing Mode	Coefficient of Linear Thermal Expansion (per °C)	
	Specimen 1	Specimen 2
Heating	3.79 E-05	3.82 E-05
Cooling	3.76 E-05	3.85 E-05
Mean Value	3.77 E-05	3.83 E-05
Corrected Mean Value*	3.73 E-05	3.79E-05
Overall Corrected Mean Value	3.76 E-05	

**Corrected for thermal expansion of silica*

2.5 Barcol Hardness

Barcol hardness was measured in accordance with ASTM D2583-07, "Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor".

The equipment used for the testing is listed below:

Instrument	Calibration Status (Valid Until Date)
Barcol 934-1 Impressor (MII #B00373)	Calibrated before use
Conditioning room (MII #B13550)	2013-08-17

Test results are presented in Table V on page 7.

TABLE V
Barcol Hardness

Reading Number	Barcol Hardness (934-1 Scale)	
	Decorative Surface	Grey Surface
1	60	62
2	62	60
3	62	62
4	63	62
5	63	61
6	63	61
7	63	62
8	64	62
9	63	61
10	62	61
Mean Value	62	61
Standard Deviation	1.1	0.70

2.6 Density

Density was determined in accordance with Test Method A of ASTM D 792-08, "Standard Test Methods for Density and Specific Gravity of Plastics by Displacement". De-ionized water at 23.8°C was used as the immersion medium.

The equipment used for the testing is listed below:

Instrument	Calibration Status (Valid Until Date)
Analytical Balance (MII #A02066)	2013-03-15
Digital Thermometer (MII #B13491)	2014-06-29
Conditioning room (MII #B13550)	2013-08-17


Test values are shown in Table VI on page 8.

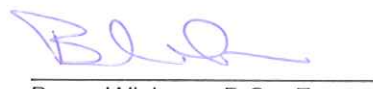
TABLE VI
Density

Specimen Number	Density (g/cm ³)	Specific Gravity
1	1.72	1.72
2	1.72	1.72
3	1.72	1.72
Mean Value	1.72	1.72
Standard Deviation	0.00085	0.001

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