



**WRAPSOL**  
320 Libbey Pkwy  
Weymouth Norfolk, MA 02189  
Attn: Igor Muravyov

**Test Report No: 177:2110789PPR1**

**Date: 28 July 2010**

**SAMPLE(S) SUBMITTED**

**BY THE CLIENT AS:** Three (3) samples of plastic film identified as Wrapsol Ultra, Invisible Shield and BodyGuardZ.

**DATE OF RECEIPT:** 15 July 2010.

**TEST PERIOD:** 20-27 July 2010.

**TEST(S) REQUESTED:** The materials were tested for Puncture Resistance in accordance with ASTM D 4833, Coefficient of Friction – per ASTM D1894, for Haze and Luminous Transmittance of Transparent Plastics – per ASTM D1003 and for Abrasion Resistance per ASTM D5264.

**TEST RESULTS:** See Pages 2 and 3.

**PREPARED BY:**

*for* **DIMITAR DIMOV, PH. D.**  
**SENIOR PROJECT ENGINEER**

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**SIGNED FOR AND ON BEHALF OF**  
**SGS U.S. TESTING COMPANY INC.:**

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**LAB. MANAGER, PACKAGING&ENVIRONMENTAL**

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**TEST RESULTS**

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Test: **PUNCTURE RESISTANCE**

PUNCTURE FORCE (lb)

Material:	Wrapsol Ultra	Invisible Shield	BodyGuardZ
	76.7	40.0	43.2
	73.0	42.1	44.2
	83.8	43.8	41.9
	77.0	40.5	46.5
	<u>69.9</u>	<u>39.5</u>	<u>36.5</u>
Avg.	<b>76.1</b>	<b>41.2</b>	<b>42.5</b>
St. Dev.	5.2	1.8	3.7

Note: Liner removed before testing.

Comment: Wrapsol film is stronger than Invisible and BodyGuardZ film.

Test: **COEFFICIENT OF FRICTION**

Material:	Wrapsol Ultra		Invisible Shield		BodyGuardZ	
	Static	Kinetic	Static	Kinetic	Static	Kinetic
	0.240	0.170	1.606	0.599	0.534	0.274
	0.221	0.159	1.781	0.805	0.440	0.252
	0.289	0.185	2.331	0.736	0.457	0.249
	0.339	0.175	2.190	0.736	0.607	0.283
	<u>0.250</u>	<u>0.173</u>	<u>1.863</u>	<u>0.599</u>	<u>0.622</u>	<u>0.254</u>
Avg.	<b>0.268</b>	<b>0.172</b>	<b>1.954</b>	<b>0.695</b>	<b>0.532</b>	<b>0.262</b>
St. Dev.	0.047	0.010	0.299	0.092	0.083	0.015

Note: Materials tested against standard polished stainless steel surface. Outer surface tested.

Comment: Extremely high friction revealed for Invisible Shield film. It is not slippery, with surface almost sticks to steel standard.

Wrapsol Ultra film surface is smooth and easy to move around.

**TEST RESULTS, CONT'D**

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Test: **HAZE AND LIGHT TRANSMITTANCE**

(%)

Material:	<b>Wrapsol Ultra</b>		<b>Invisible Shield</b>		<b>BodyGuardZ</b>	
	Haze	Light Transmit.	Haze	Light Transmit.	Haze	Light Transmit.
	2.3	93.7	1.8	93.3	32.0	92.4
	2.3	93.2	2.3	93.2	32.8	92.0
	2.1	93.2	1.9	93.3	34.3	92.2
	2.1	93.2	2.1	93.3	32.9	92.3
	<u>2.3</u>	<u>93.0</u>	<u>1.6</u>	<u>93.3</u>	<u>33.2</u>	<u>92.2</u>
Avg.	<b>2.2</b>	<b>93.3</b>	<b>1.9</b>	<b>93.3</b>	<b>33.0</b>	<b>92.2</b>

Note: Liner removed before testing.

Comment: Light that is scattered upon passing through a film can produce a hazy field (reducing a contrast) when objects are viewed through the material. Materials having a haze greater than 30% are considered diffusing.  
The higher is the luminous (light) transmittance the more transparent is the material.

Test: **ABRASION RESISTANCE**

Material:		Cycles Abrasion Applied			
		0	50	100	200
<b>Wrapsol Ultra</b>		0	50	100	200
	Haze	2.3	3.5	4.4	4.5
<b>Invisible Shield</b>		0	50	100	200
	Haze	1.6	3.1	9.8	11.2
<b>BodyGuardZ</b>		0	50	100	200
	Haze	32.0	32.0	33.5	34.3

Note: Effect of abrasion was evaluated measuring the haze of plastic films after 0, 50, 100 and 200 cycles. Used 2 lb block and as abradant a 3M Emery Polishing 4/0 Sand Paper, material with surface similar to fabrics but with consistent properties.

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We trust the results will prove useful and informative. Should you have any questions, please feel free to contact us

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END OF REPORT