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## *Evaluation of Stretch Films*

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**Project #:** 12-143-1125(bis)

**Test conducted by:**

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**Approved by:**

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**Date:** June 28, 2012



**Background:** Customer submitted two samples of VCI stretch film and requested that the physical and anti-corrosion properties of the film be tested.

**Sample Received:**

- 1) Green Stretch Film, VCI Brazil, provided by Samuel, good condition, received 06-11-12
- 2) Blue Film, Provided by ITW Fleetwood, Manufacturer unknown, good condition, received 06-11,12

**Method:**

- 1) VIA Test CC-027
- 2) Razor Blade Test CC-004\*
- 3) FTIR Test CC-006
- 4) Nitrite Test\*
- 5) Mechanical Properties (Performed at Cambridge):
  - a. Breaking Factor, ASTM D882-02\*
  - b. Tensile Strength at Break, Yield Strength, and Elongation at Break, ASTM D882-02\*
  - c. Puncture Resistance, MIL-STD-3010, TM 2065\*
  - d. Tear Strength, ASTM D1922-06a\*
  - e. Anti-Static Film Test\*

\*Cortec Laboratory is not accredited for the test marked

**Materials:**

- 1) VIA test kit
- 2) Razor Blade test kit
- 3) Paragon 1000 FTIR
- 4) Nitrite/Nitrate Test Strips

**Procedure:**

- 1) The above tests were performed according to standard procedures.
- 2) The tests were performed from 06/13/12 to 06/26/12

**Results:**

**Razor Blade Carbon Steel**

Sample	Panel 1	Panel 2	Panel 3
Green Film	Fail	Fail	Fail
Blue Film	Fail	Pass	Pass
Control	Fail	-	-

**Razor Blade Copper**

Sample	Panel 1	Panel 2	Panel 3
Green Film	Fail	Fail	Fail
Blue Film	Fail	Fail	Fail
Control	Fail	-	-

### VIA Test Results

Sample	Plug #1	Plug #2	Plug #3	Pass/Fail
Green Film	Grade 0	Grade 0	Grade 0	Fail
Blue Film	Grade 0	Grade 0	Grade 0	Fail
Control	Grade 0	-	-	

Note: The VIA grading system is attached to the end of the report

### Physical Properties Results

<u>Property</u>	-	<u>Test Method</u>	<u>Units</u>	<u>Blue ITW Stretch</u>	<u>Green Stretch</u>
Caliper		ASTM D6988	mil	3.19	3.40
Breaking Factor	MD	ASTM D882-02	lbs/in	17.97	15.99
	TD			16.21	14.22
Tensile Strength at Break	MD	ASTM D882-02	psi	5723.67	4912.21
	TD			5162.52	4493.31
Elongation at Break	MD	ASTM D882-02	%	874.01	757.56
	TD			861.87	814.48
Yield Strength	MD	ASTM D882-02	psi	1115.80	1159.72
	TD			1361.71	1546.31
Puncture Resistance		MIL-STD-3010, TM 2065	lbf	4.89	5.12
Cling Peel		ASTM D5458-97	gf/in	315.80	

<u>Property</u>	-	<u>Test Method</u>	<u>Units</u>	<u>Blue ITW Stretch</u>	<u>Green Stretch</u>
Tear Strength MD	MD	ASTM D1922-06a	%	45.60	25.00
	MD	ASTM D1922-06a	Gram Force	1459.20	800.00
	MD	ASTM D1922-06a	Gram Force/Mil	462.00	250.38
	MD	ASTM D1922-06a	mN	14314.75	7848.00

<u>Property</u>	-	<u>Test Method</u>	<u>Units</u>	<u>Blue ITW Stretch</u>	<u>Green Stretch</u>
Tear Strength CD	TD	ASTM D1922-06a	%	57.00	41.60
	TD	ASTM D1922-06a	Gram Force	1824.00	1331.20
	TD	ASTM D1922-06a	Gram Force/Mil	573.96	429.27
	TD	ASTM D1922-06a	mN	17893.44	13059.07

**Results relate only to the items tested**

**Interpretations:**

- 1) Based on the test results, the submitted Green film did not provide any corrosion protection. Analysis of the FTIR did not show any signs of corrosion inhibitors.
- 2) The Blue film test results indicated that the Blue film provides some contact-phase corrosion protection for carbon steel. The razor blade test on copper demonstrated that it did not provide contact-phase corrosion inhibition for copper. The VIA test results determined that the Blue film did not provide vapor-phase corrosion inhibition. Based on FTIR data the Blue film was found to contain nitrite only.

**VIA Test Grades (Grade 2 or 3 are passing)**

- Grade 0: Blind test  
No corrosion inhibiting effect
- Grade 1: Blind test  
Minute corrosion inhibiting effect
- Grade 2: Blind test  
Medium corrosion inhibiting effect
- Grade 3: Blind test  
Good corrosion inhibiting effect





