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ANAB ACCREDITED ISO/IEC 17025 TESTING LABORATORY

Comparison Testing Armor Film-VpCI-126

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Results reported by:

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Background:
Customer is a full-service packaging company specializing in export packaging. They are currently using Armor VCI film for their packaging operations but is considering switching to VpCI-126 film. After reviewing the VCI film Master Report, the customer would like their specific batch of Armor film tested for its corrosion protection capabilities. They have submitted a sample of Armor VCI film to Cortec for evaluation of its corrosion protection properties.

Sample Received:
Clear film labeled VCI poly received 1/21/19 in good condition.

Method: VIA Test, CC-027
*****Razor Blade Test CC-004
**The test(s) marked are not covered under Cortec Laboratories, Inc. ISO 17025 Scope of Accreditation*

Materials: Oven set at 40°C (#10)
Thermometer #170760164
VIA test kit
Razor Blade test kit
VIA solution Lot #M31D003
VpCI-126 film Lot #710240
Methanol, ACS grade Lot #55028, and Lot #032916C
0.005% NaCl
DI water

Procedure:
Razor Blade Test.
Used four carbon steel panels for both the Armor film, and the VpCI-126 film, one panel for a control for each film and three for testing on each film. Copper panels used for both Armor and VpCI-126 film. The copper panels were sanded and cleaned off with methanol. One control panel and three for testing were used on each film. DI water was Used on the carbon steel. 0.005% NaCl was use on the copper, started at 8:00AM complete at 12:00PM 1/29/19. Started The carbon steel at 8:00AM and finished at 10:00AM 1/29/19.

VIA Test.
Used Four carbon steel plugs for both the Armor film, and the VpCI-126 film, one plug for a control for each film and three for testing on each film. All plugs sanded with 120 grit sand paper and then 320 grit sand paper, and then soaked in methanol for five minutes. Cut two strips of both the Armor film, and the VpCI-126 film, for each plug. Dried plugs, using four jars for both the Armor film, and the VpCI-126 film, one control and three for testing on each film. Put plugs in the plug section of the jar lid, attached two strips of film to each lid. Conditioned from 12:30PM 2/4/19 until 8:30AM 2/5/19. Added 10ml VIA solution to each jar at 8:30AM 2/5/19, conditioned till 10:30AM 2/5/19. Placed jars in oven, set at 40.0°C, reading 40.1°C, at 10:30AM 2/5/19. Removed jars at 12:30PM 2/5/19. Allowed plugs to dry and read the results.

Results:

Razor Blade Test Carbon Steel Panels

Sample	Panel #1	Panel #2	Panel #3	End Result
VpCI-126	Pass	Pass	Pass	Pass
Armor Film	Pass	Fail	Fail	Fail
Control	Fail	-	-	Fail

Razor Blade Test Copper Panels

Sample	Panel #1	Panel #2	Panel #3	End Result
VpCI-126	Pass	Pass	Pass	Pass
Armor	Fail	Fail	Fail	Fail
Control	Fail	-	-	Fail

VIA Test

Sample	Plug A	Plug B	Plug C	End Result
VpCI-126	3	3	3	Pass
Control	0	-	-	Fail
Armor Film	1	0	1	Fail
Control	0	-	-	Fail

Photos:

VIA Test Grading

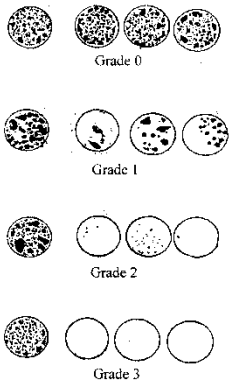
All three plugs must be grade 2 or better to pass the test

Grade 0: Blind test
No corrosion inhibiting effect

Grade 1: Blind test
Minute corrosion inhibiting effect

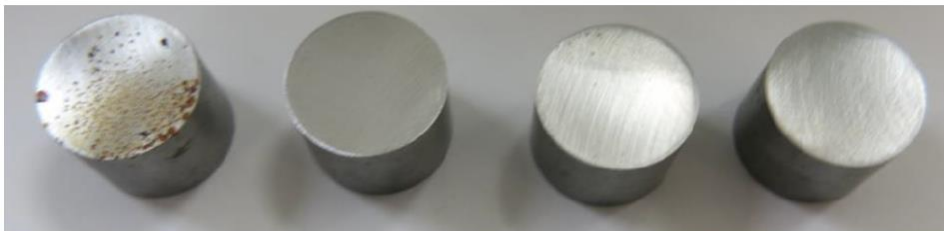
Grade 2: Blind test
Medium corrosion inhibiting effect

Grade 3: Blind test
Good corrosion inhibiting effect



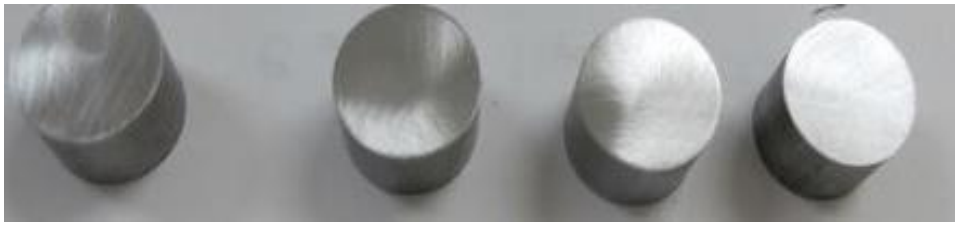
VpCI-126 Before

VpCI-126 After

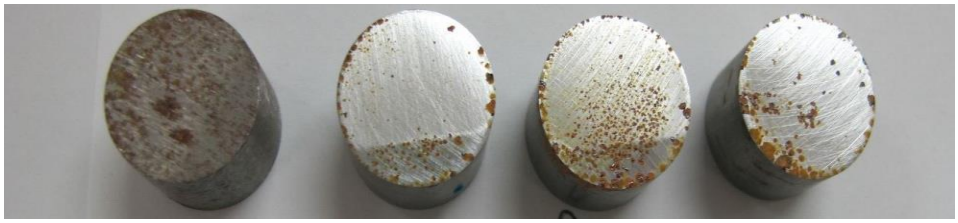


VpCI-126 from left to right: Control, Plug A, Plug B, and Plug C

Armor Film Before



Armor Film After



Armor Film from left to right: Control, Plug A, Plug B, and Plug C

Interpretations:

The Armor film submitted by the customer does not provide sufficient contact or vapor phase corrosion protection. The submitted Armor film sample did not pass the razor blade test for steel or copper, nor did it pass the VIA (vapor inhibitor ability test). VpCI-126 shows excellent contact and vapor-phase corrosion protection by passing both the razor blade and VIA tests.