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Evaluation of VCI Properties for Barrier Bag Submitted by Customer

Purpose: Evaluate anticorrosion properties of a laminated barrier bag, made with Daubert anti-corrosion film, submitted by customer. The performance of the submitted bag is compared with that of the Cortec CorrLam bag.

Visual Observation: Visually, the film of submitted bag is composed of 3 layers—a clear outer layer, a silvery foil middle layer, and a green inner layer of PE film.

Materials:

- 1) Submitted bag
- 2) Cortec CorrLam bag
- 3) Untreated PE film as negative control
- 4) Carbon Steel Panels
- 5) Copper Panels
- 6) Methanol-lab grade
- 7) Razor Blade test kit
- 8) VIA test kit
- 9) Duct tape and binder clips

Method:

- 1) Razor Blade test, CC-004
- 2) VIA test
- 3) Nitrite Test
- 4) FTIR Spectroscopy
- 5) Humidity Cabinet, ASTM D-1748

Procedure:

- 1) Razor Blade test and VIA test were performed according to standard procedures for each.
- 2) The inner green film of the submitted bag was scanned with FT-IR for presence of vapor corrosion inhibitors. The green film was separated from the rest of the bag material by first peeling off the outer clear film, then breaking off the foil layer by stretching the resulting film.

- 3) A cleaned carbon steel panel was enclosed in a sealed pouch made from the film of submitted bag, and that of Cortec CorrLam, respectively, and placed inside the humidity cabinet for 3 days. The pouches were made by folding the edges over, sealing them with duct tape, then clipping tightly with binder clips on all sides.

Results:

Nitrite Test

The submitted film is nitrite negative.

Razor Blade Test Performed on Carbon Steel Panels

Submitted Film			PE film	CorrLam		
Panel 1	Panel 2	Panel 3	Control	Panel 1	Panel 2	Panel 3
Fail	Fail	Fail	Fail	Pass	Pass	Pass

Razor Blade Test Performed on Copper Panels

Submitted Film			PE film	CorrLam		
Panel 1	Panel 2	Panel 3	Control	Panel 1	Panel 2	Panel 3
Fail	Fail	Fail	Fail	Pass	Pass	Pass

VIA Test

Submitted Film			PE film	CorrLam		
Plug 1	Plug 2	Plug 3	Control	Plug 1	Plug 2	Plug 3
Grade 0	Grade 0	Grade 1	Grade 0	Grade 3	Grade 3	Grade 2

Note: VIA Grading system is attached below

FT-IR Scan (CC- 006)

The scanning of the inner green layer showed no obvious presence of vapor corrosion inhibitors, if any. A scan spectrum is attached.

Humidity Cabinet (ASTM D-1748)

After 3 days, the carbon steel panel enclosed in the submitted film pouch showed signs of corrosion, while that in the Cortec CorrLam showed none. The photos are shown below:



Conclusion: The submitted film failed Razor Blade Test, VIA Test, and Humidity Cabinet Test. The FT-IR scan revealed that the inner green layer of the submitted film contains no obvious presence of vapor corrosion inhibitors, if any. In comparison, Cortec CorrLam passed all the above tests, and contains vapor corrosion inhibitor. Cortec CorrLam film/bag is strongly recommended.

Attachment: FT-IR scan spectrum of inner green layer of the submitted film.

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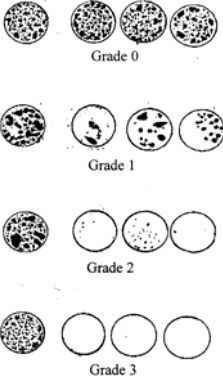
To: Bill Harrod

From: Ming Shen

Date: January 19, 2010

cc: Boris Miksic
Anna Vignetti
Rita Kharshan
Cliff Cracauer
Bob Boyle
Mike Morin

VIA Test Grades (Grade 2 or 3 are passing)

<p>Grade 0: Blind test No corrosion inhibiting effect</p> <p>Grade 1: Blind test Minute corrosion inhibiting effect</p> <p>Grade 2: Blind test Medium corrosion inhibiting effect</p> <p>Grade 3: Blind test Good corrosion inhibiting effect</p>	 <p>The image shows four rows of circular test results, each labeled with a grade. Grade 0 shows four circles with heavy, dark, irregular corrosion patterns. Grade 1 shows four circles with lighter, more sparse corrosion patterns. Grade 2 shows four circles with very light, minimal corrosion patterns. Grade 3 shows four circles that are almost entirely blank, indicating no visible corrosion.</p>
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