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LABORATORY ACCREDITATION BUREAU
ACCREDITED ISO/IEC 17025
Certificate # L2267 Testing

Evaluation of Zormot-VCI UV Shrink Film
Final Report

To: Customer

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Project #:13-090-1125.2.bis

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Date: November 22, 2013

Background: It was requested that Zormot-VCI UV Shrink film be tested for corrosion protection and comparison of UV properties to VpCI-126 Blue HP UV Shrink film.

Sample Received:

1) Dark green Zormot film, good condition, received 04/29/13

Method:

1) VIA Test (CC-027)
2) Razor Blade Test (CC-004), modified*
3) FTIR Test (CC-006)
4) QUV Test

*Cortec Laboratory is not accredited for the test marked

Materials:

1. VIA Test Kit
2. Laboratory Grade Methanol
3. Carbon Steel Panels
4. Copper Panels
5. Control Film, Plain Polyethylene Film
6. Deionized Water
7. Paragon 1000 FTIR
8. QUV Chamber

Procedure:

Corrosion Testing:

1. The tests were performed according to their standard procedures. For the razor blade test for the Zormot film, only 1 panel was tested for each metal because of limited amount of film submitted for testing.

QUV Testing

1. The QUV test was performed according to standard procedure. UV-B lamps were used, and the QUV was cycled between the following two cycles:
    a. Condensation cycle: 40°C for 4 hours
    b. UV Cycle: 60°C for 4 hours
2. The panels were cleaned, and then wrapped in film and the edges of the film were heat sealed shut. The wrapped panels were then placed into the QUV chamber.
3. After 3744 hours (156 days) the panels were removed once a visible change was seen in the Zormot film, and photos were taken.

Results:

Razor Blade Test – Carbon Steel

Sample	Panel 1	Panel 2	Panel 3
Zormot	Pass	-	-
VpCI-126 HP UV Shrink Film	Pass	Pass	Pass
Control	Fail	-	-

Razor Blade Test – Copper

Sample	Panel 1	Panel 2	Panel 3
Zormot	Fail	-	-
VpCI-126 HP UV Shrink Film	Pass	Pass	Pass
Control	Fail	-	-

VIA Test

Sample	Plug # 1	Plug # 2	Plug # 3	Pass / Fail
Zormot	Grade 1	Grade 1	Grade 2	Fail
VpCI-126 HP UV Shrink Film	Grade 2	Grade 2	Grade 2	Pass
Control	Grade 0	N/A	N/A	Fail

Note: Grades 0 and 1 are considered failing. See below for grading scale example.

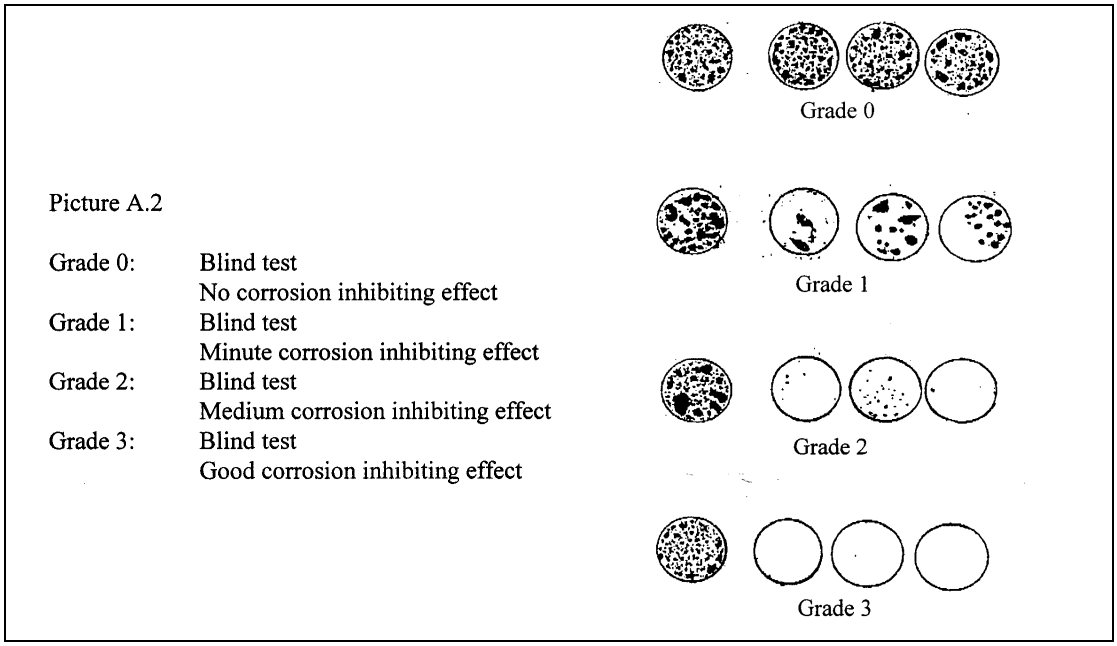

Figure 1. VIA Plug Grading Scheme

Results relate only to the items tested

Photos:

Figure 1. Zormot film and VpCI-126 HP UV Shrink film after being in the QUV for 156 days.

Interpretations:

1) Based on the VIA test results, the Zormot film does not provide vapor-phase corrosion protection.
2) The Razor Blade test results determined that the Zormot film did not provide contact-phase corrosion protection for copper, but it did protect against corrosion for carbon steel.
3) UV testing demonstrated that the Zormot film did not last as long as the VpCI-126 HP UV Shrink film. After 156 days in the set conditions, the Zormot VCI-UV film cracked and started degrading.
4) The razor blade and VIA test results for VpCI-126 HP UV Shrink demonstrated that it provided good vapor-phase and contact-phase corrosion inhibition.