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Evaluation of RUST-X VCI Film and Paper

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Project #:10-226-1125(bis)

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Date: November 3, 2010





Background: Customer submitted a sample of RUST-X VCI paper and film for corrosion inhibition testing. RUST-X is a part of HI-Tech group with manufacturing facilities in India. Representatives from RUST-X have been actively soliciting and trying to establish business in Europe and India.

Samples Received:

Rust-X Film Rust-X Paper

Method:

VIA Test Method Razorblade Test Method Tensile Strength, ASTM D882 Tear Resistance, ASTM D1922 Puncture Resistance, MIL-STD-3010B, Test Method 2065

Materials:

VIA Test Kit Razorblade Test Kit Oakland Tensile Test Stand Thwing-Albert Tear Tester

Procedure:

All tests were carried out according to standard test procedures.

Results:

Table 1. VIA Test Results

Sample	Plug 1	Plug 2	Plug 3	Control
RUST-X Paper	Grade 0	Grade 1	Grade 0	Grade 0
VpCI-146	Grade 3	Grade 3	Grade 3	Grade 0
VpCI-126	Grade 3	Grade 3	Grade 2	Grade 0
RUST-X Film	Grade 0	Grade 0	Grade 0	Grade 0

Table 2. Carbon Steel Razorblade Test Results

Sample	Panel 1	Panel 2	Panel 3	Control
RUST-X Paper	Pass	Pass	Pass	Fail
VpCI-146	Pass	Pass	Pass	Fail
VpCI-126	Pass	Pass	Pass	Fail
RUST-X Film	Fail	Fail	Fail	Fail

Table 3. Copper Razorblade Test Results

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Sample	Panel 1	Panel 2	Panel 3	Control
RUST-X Paper	Pass	Pass	Pass	Fail
VpCI-146	Pass	Pass	Pass	Fail
VpCI-126	Pass	Pass	Pass	Fail
RUST-X Film	Fail	Fail	Pass	Fail

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Table 4. Mechanical Properties Comparison of RUST-X Film to VpCI-126

Property		Test Method	<u>Units</u>	Rust-X	<u>VpCI-126</u>
Caliper		ASTM D6988	mil	3.00	3.00
Breaking Factor	MD	ASTM D882-02	lbs/in	12.14	9.58
	TD	ASTM D002-02		12.43	9.86
Tensile Strength at Break	MD	ASTM D882-02	psi	4217.46	3375.35
	TD			3801.86	3474.67
Elongation at Break	MD	ASTM D882-02	%	606.35	677.77
	TD	ASTM D002-02		913.28	712.55
Yield Strength	MD	ASTM D882-02	psi	1984.22	1355.33
	CD	ASTWI D002-02		1503.82	1404.83
Tear Strength	MD	ASTM D1922- 06a	mN	957.46	8350.27
	CD			9511.78	9857.09
Puncture Resistance		MIL-STD- 3010B, Test Method 2065	lbf	3.99	4.11

Conclusions:

- 1. RUST-X Film and Paper failed to provide vapor-phase corrosion protection as demonstrated by the VIA test.
- 2. RUST-X Paper provides corrosion protection while in direct contact with both ferrous and non-ferrous metals; however, the submitted RUST-X film did not provide sufficient protection for neither ferrous nor non-ferrous metals.
- 3. FT-IR spectra doesn't show evidence of any corrosion inhibitors in the film.

VIA Test Grades (Grade 2 or 3 are passing)



Grade 0: Blind test

No corrosion inhibiting effect

Grade 1: Blind test

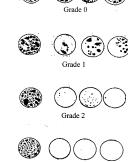
Minute corrosion inhibiting effect

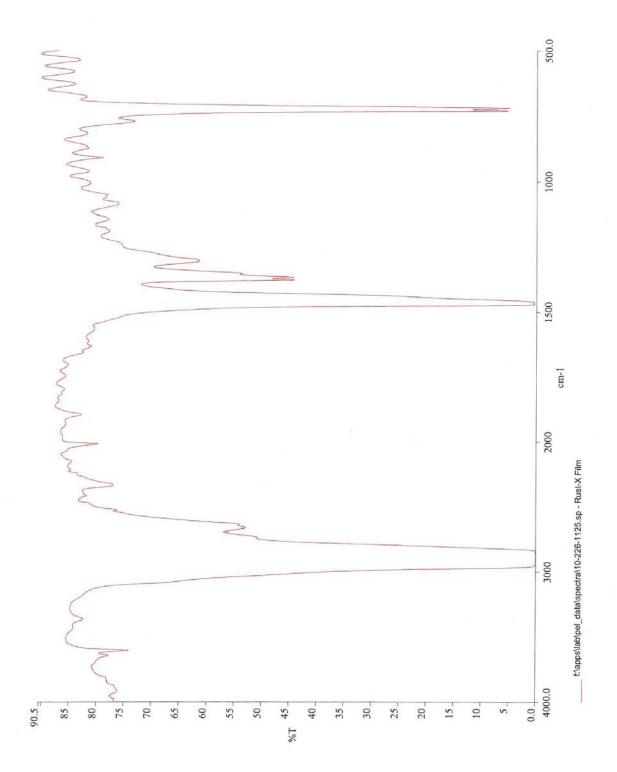
Grade 2: Blind test

Medium corrosion inhibiting effect

Grade 3: Blind test

Good corrosion inhibiting effect





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