

***Evaluation and Comparison of
Boselon, Daubert and Northern Instruments VCI Films and
SKS VCI Paper with Cortec VCI Film and Paper***

Background: Several samples of VCI film and paper were submitted to Cortec's laboratory for evaluation. It is also desired to validate similarities of these samples with samples previously tested. The following samples were received for evaluation:

Two olive-green partial VCI bags (Boselon), 3.3-mil
Two clear blue partial VCI bags (Daubert), 3.7-mil
Two clear light-yellow partial bags (Northern Instruments), 1.7-mil
One large piece of Anox VCI paper (SKS)

Purpose: Evaluate the corrosion protection abilities of the above film and paper samples and compare with Cortec VCI film and paper. Also validate similarities between these samples and previously tested samples.

Methods: FT-IR Spectroscopy
Razor Blade Test
TL-8135-002 (German VIA Test)
ASTM D 1748 (Humidity chamber)
NO₂/NO₃ Test

Materials: Paragon 1000 FT-IR, Perkin Elmer
Razor Blade Test Kit
German VIA Test Kit
EM Quant NO₂ test strips, EM Industries, Inc., Gibbstown, NJ
(charge/lot #60110251)
EM Quant NO₃ test strips, EM Industries, Inc., Gibbstown, NJ
(charge/lot #80322977)
Panels (CS 1010)

Procedure: The above tests were performed according to the standard procedures for each.

Results: *FT-IR Spectroscopy:* According to the spectra for all three film samples, any levels of inhibitors are undetectable. The clear blue film made by Daubert is a co-extruded film.

NO₂/NO₃ Test: The Anox VCI paper (SKS) contains a heavy concentration of nitrite.

Razor Blade Test on Films

Material	Panel #1	Panel #2	Panel #3
Olive-green (Boselon)	Fail	Fail	Fail
Clear blue (Daubert)	Fail	Fail	Fail
Clear light-yellow (Northern)	Fail	Fail	Fail
VCI-126* (Cortec)	Pass	Pass	Pass
Control	Fail	-	-

*Typical results for VCI-126 film.

Razor Blade Test on Papers

Material	Panel #1	Panel #2	Panel #3
Anox VCI (SKS)	Pass	Pass	Pass
VCI-146* (Cortec)	Pass	Pass	Pass
Control	Fail	-	-

*Typical results for VCI-146 paper.

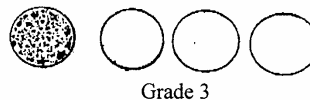
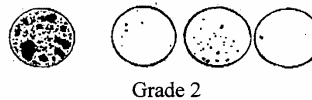
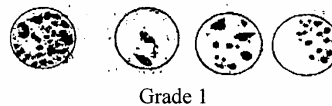
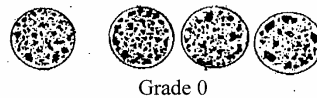
German VIA Test

Material	Plug #1	Plug #2	Plug #3
Olive-green (Boselon)		Grade 1	
Clear blue (Daubert)		Grade 1	
Clear light-yellow (Northern)		Grade 1	
VCI-126* (Cortec)		Grade 3	
Anox VCI (SKS)		Grade 2	
VCI-146** (Cortec)		Grade 2	
Control	Fail	-	-

*Typical results for VCI-126 film.

**Typical results for VCI-146 paper.

German VIA Test Grades



Picture A.2

- 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

ASTM D 1748 (Humidity chamber)

Material	Panel #1	Panel #2	Panel #3
Olive-green film (Boselon)	Light corrosion	Light corrosion	Light corrosion
Clear blue film (Daubert)	Light corrosion	Light corrosion	-
Clear light-yellow film (Northern)	Light corrosion	Light corrosion	Light corrosion
Control	Light corrosion	-	-

Note: Only two panels were tested for Daubert film due to the small size of the sample provided.

See attached photos of the results.

Conclusions:

1. According to the above test results, all three of the competitor films failed to provide sufficient contact, vapor or barrier protection (see Razor Blade, German VIA and Humidity tests).
2. Previous test reports on VCI films manufactured by Daubert, Northern Instruments and Boselon reveal similar test results. Refer to the following projects:

5073-1125 7085-1125
5160-1125 8150-1125
5277-1125 9171-1125
6166-1125

3. According to the test results, the Anox VCI paper (SKS) provided the same level of contact and vapor corrosion protection as Cortec's VCI-146 paper. The Anox VCI paper contains a high concentration of nitrites. Cortec VCI-146 does not contain nitrites.

Estimated Cost of Project: \$200.00

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To: Tom Nelson

For: Cortec Corporation

From: Debbie Hannan

Date: April 25, 2000

cc: Boris Miksic
Art Ahlbrecht
Anna Vignetti