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## *Evaluation of Zerust Excor Film and Masterbatch*

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**Project #:** 15-137-1125

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Technical Service Engineer



**Background:** Two samples of Zerust Excor film and a sample of Excor masterbatch has been submitted for testing in comparison to Cortec's VpCI-126 film and masterbatch.

**Sample Received:** The following samples were received on 6-22-15 in good condition:  
1. Yellow Excor film bag, 4mil (B 3434, 120804)  
2. Yellow Excor film bag, 4mil (B 0515, 120805)  
3. Excor Masterbatch (plastic pellets)

**Method:** VIA Test, CC-027  
Razor Blade Test, CC-004\*  
Nitrite/Nitrate Test\*  
FTIR analysis, CC-006  
*\*Cortec Laboratories, Inc is not ISO/IEC 17025 accredited for the test(s) marked.*

**Materials:** VIA test kit  
Razor blade test kit  
Nitrite/Nitrate Test Strips  
Paragon 1000 FTIR  
VpCI-126 film, 4mil (batch #36225)  
M-126 Blue (batch #37532)  
Plain polyethylene film, 2mils (control)  
Methanol, lab grade (lot #041715D)

**Procedure:** The tests were conducted according to standard procedures for each test.

**Results:**

**Razor Blade Test- Carbon Steel Panels**

Sample	Panel #1	Panel #2	Panel #3	End Result
Excor film (B 3434, 120804)	Pass	Pass	Pass	Pass
Excor film (B 0515, 120805)	Fail	Fail	Pass	Fail
VpCI-126 film	Pass	Pass	Pass	Pass
Control	Fail	-	-	Fail

**Razor Blade Test- Copper Panels**

Sample	Panel #1	Panel #2	Panel #3	End Result
Excor film (B 3434, 120804)	Fail	Fail	Fail	Fail
Excor film (B 0515, 120805)	Fail	Fail	Fail	Fail
VpCI-126 film	Pass	Pass	Pass	Pass
Control	Fail	-	-	Fail

**Nitrite/Nitrate Test Strip Results**

Sample	Results
Excor film (B 3434, 120804)	Does not contain any nitrite or nitrate
Excor film (B 0515, 120805)	Does not contain any nitrite or nitrate
Excor Masterbatch	Does not contain any nitrite or nitrate

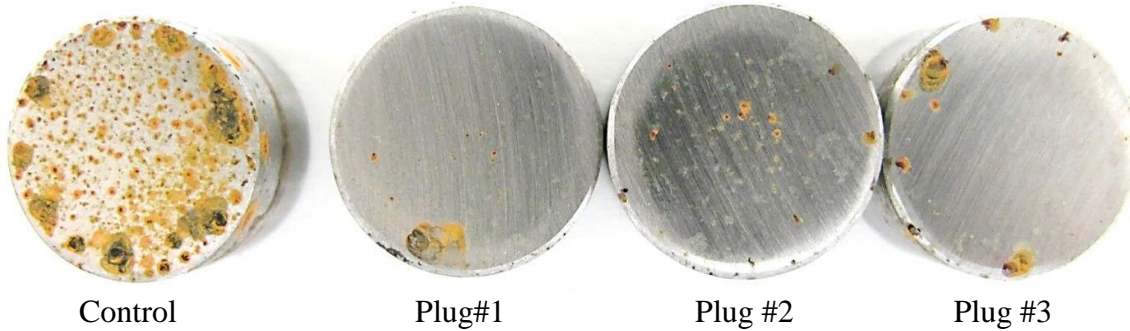
**Results:**

**VIA Test**

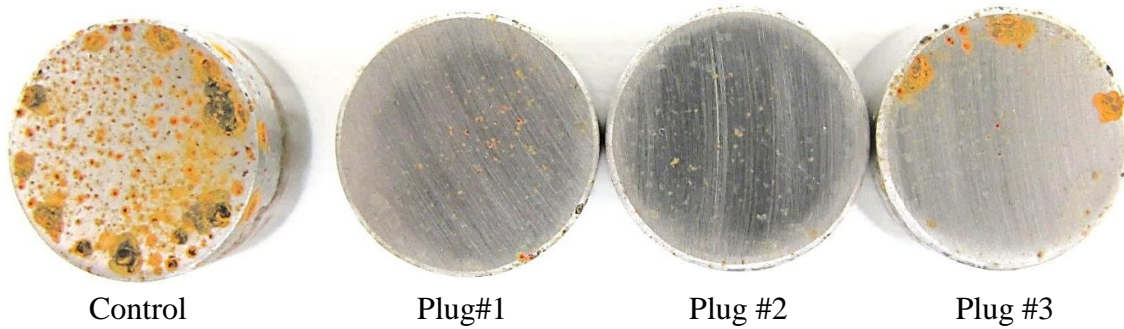
Sample	Plug #1	Plug #2	Plug #3	End Result
Excor film (B 3434, 120804)	Grade 2	Grade 1	Grade 1	Fail
Excor film (B 0515, 120805)	Grade 2	Grade 2	Grade 1	Fail
Excor Masterbatch (tested with 500mg per jar)	Grade 2	Grade 2	Grade 1	Fail
Cortec Masterbatch (tested with 500mg per jar)	Grade 2	Grade 2	Grade 2	Pass
VpCI-126 film	Grade 3	Grade 3	Grade 2	Pass
Control	Grade 0	-	-	Fail

**Photos from VIA Testing:**

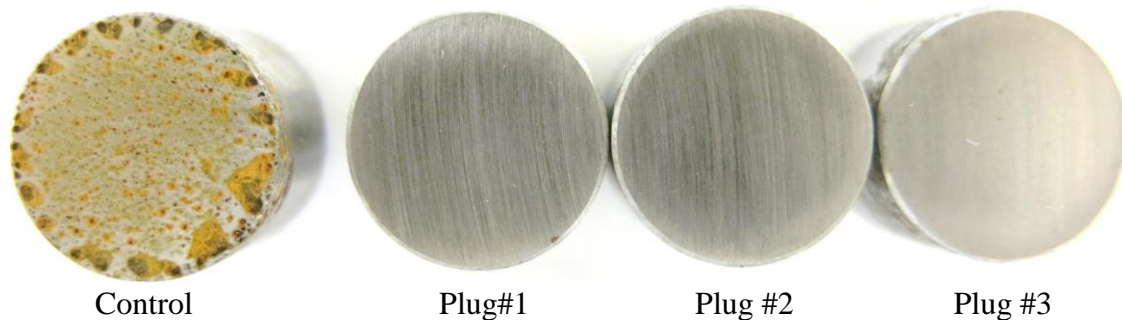
Excor film (B 3434, 120804)



Excor film (B 0515, 120805)

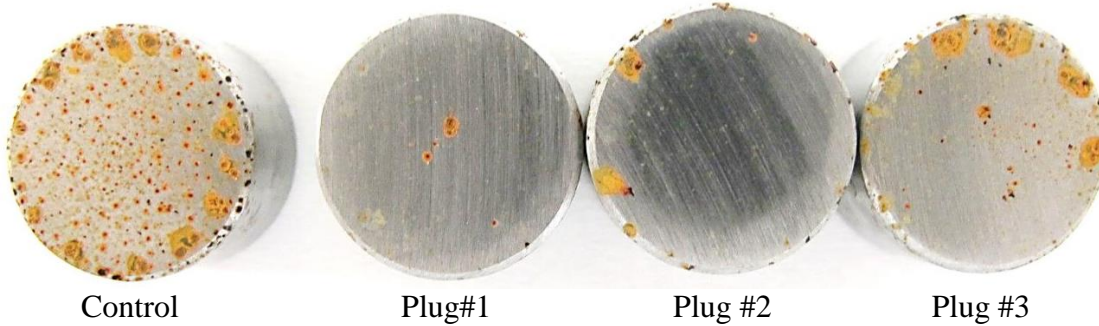


Cortec's VpCI-126 film

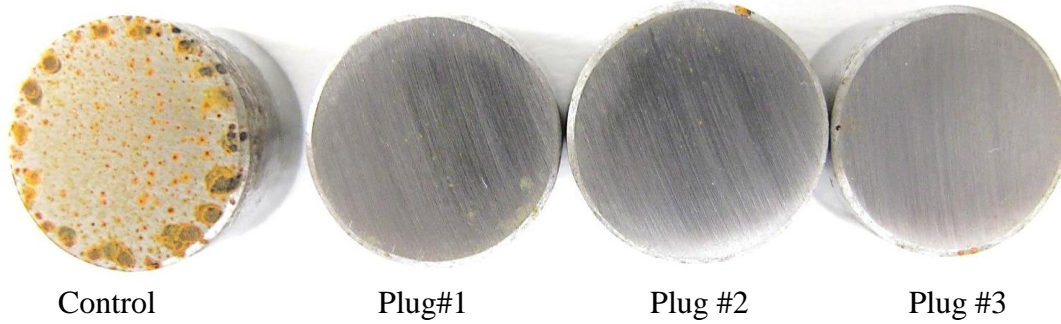


**Photos from VIA Testing:**

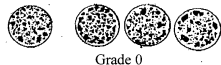
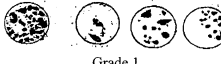
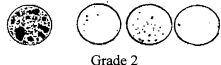
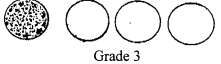
Excor Masterbatch (tested with 500mg per jar)



Cortec Masterbatch (tested with 500mg per jar)

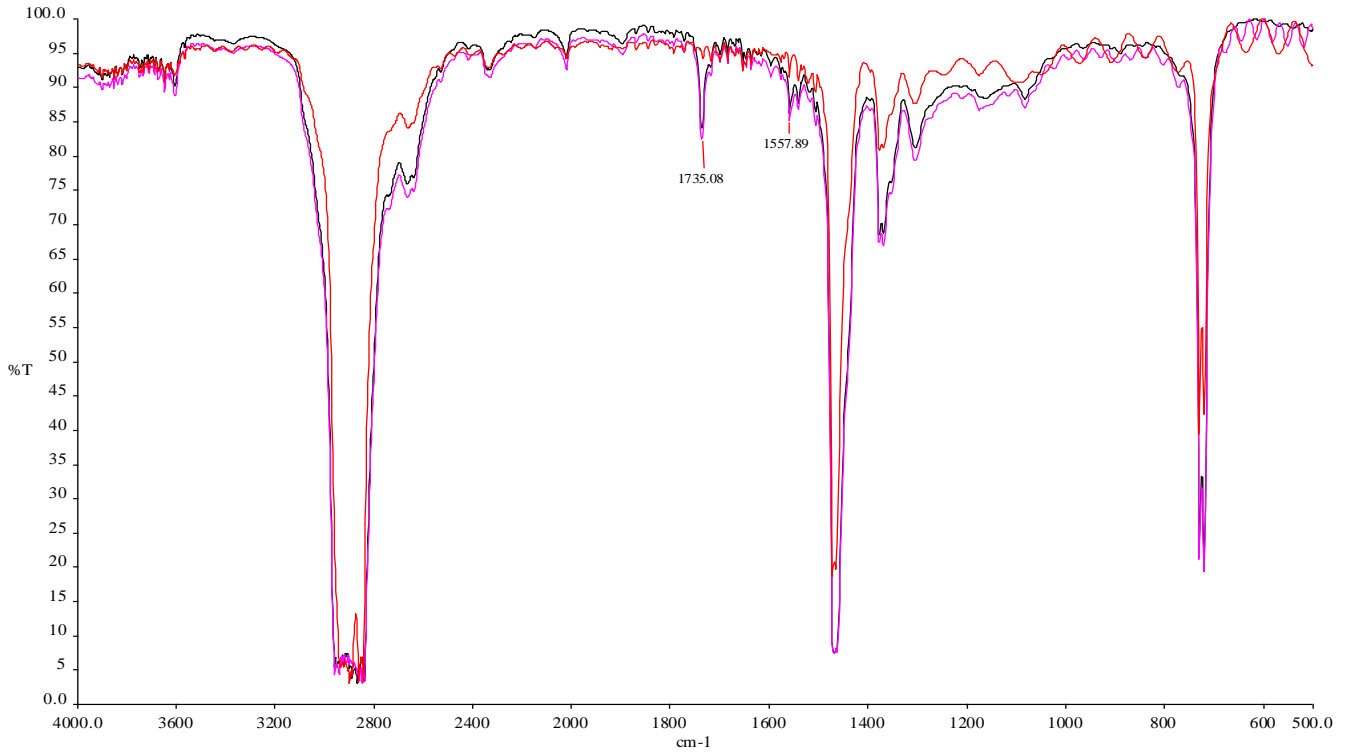


VIA Test Grades (Grade 2 or 3 are passing)  
All three plugs must be grade 2 or better to pass the test

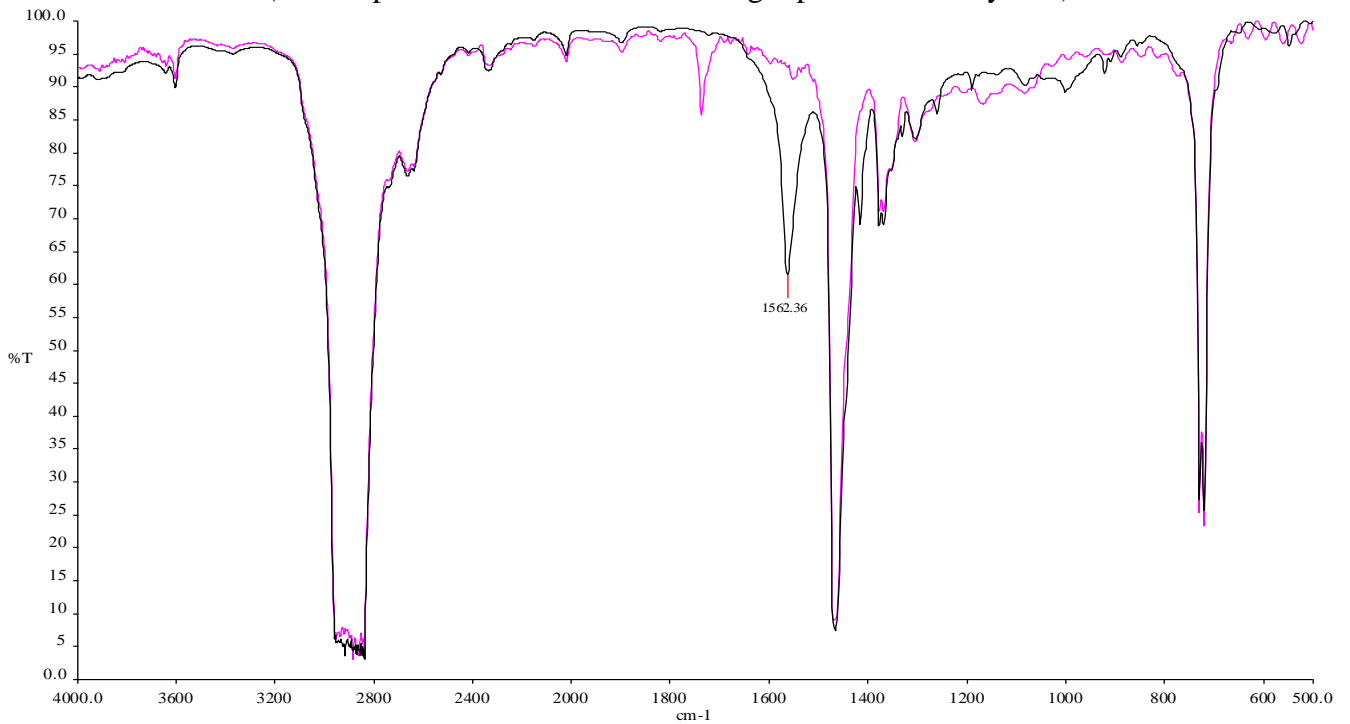
Grade 0:	Blind test No corrosion inhibiting effect	
Grade 1:	Blind test Minute corrosion inhibiting effect	
Grade 2:	Blind test Medium corrosion inhibiting effect	
Grade 3:	Blind test Good corrosion inhibiting effect	

# FTIR Analysis

Excor films compared to plain polyethylene film  
(note- both Excor films have the same peaks)



Excor films compared to VpCI-126 film  
(note- VpCI-126 film shows the stronger peak of carboxylates)



**Interpretations:**

The samples of Zerust Excor film and masterbatch showed almost all negative results for both contact and vapor phase analyses. One of the film samples passed razor blade testing on carbon steel, but the second film did not. Both films failed razor blade testing on copper, and further, they failed VIA testing. FTIR testing showed weak peaks for corrosion inhibiting chemistry.

Cortec film and masterbatch proved to be superior in both contact and vapor phase corrosion protection.