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Evaluation of Metpro Film Compared to VpCI-126 Film

To: Customer

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Project #: 18-188-1125.bis

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Background: The customer located in Mexico, had previously been using a Metpro VCI bag, but has recently switched to VpCI-126 film and BioPad to ship parts to Tesla in California. This report will evaluate the corrosion protection of the Metpro film compared to VpCI-126 film to reinforce customer's decision to switch to Cortec's film.

Sample Received: Blue Metpro film, 4mils, received on 9/19/18 in good condition.

Method: FTIR Analysis, CC-006
 Razor Blade Test, CC-004*
 NACE Standard VIA Test, TM0208-2008, item No. 21253*
 *The tests marked are not covered under Cortec Laboratories, Inc. ISO 17025 Scope of Accreditation

Materials: VIA test kit (testing jars/apparatus, steel plugs, 400grit sandpaper)
 VpCI-126 film, 4mil (batch #510220)
 Carbon Steel panels, SAE 1010 (for razor blade testing)
 Copper panels (for razor blade testing)
 Glycerol (lot #Q10A018)
 Methanol, ACS grade (lot #071417B)

Procedure: For VIA testing, the procedure was followed according to NACE VIA Test, TM0208-2008 option 2 (option 2 uses machine-aided grinding and polishing for the steel plugs).

Note- the VIA tests were conducted using two strips of sample per jar (1" X 6" per strip)

The FTIR analysis and razor blade testing was followed according to standard procedure.

Results: The following results were found:

Razor Blade Test- Carbon Steel Panels

Sample	Panel #1	Panel #2	Panel #3	End Result
Metpro Film	Fail	Fail	Fail	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
Metpro Film	Fail	Fail	Fail	Fail
VpCI-126 Film*	Pass	Pass	Pass	Pass
Control	Fail	-	-	Fail

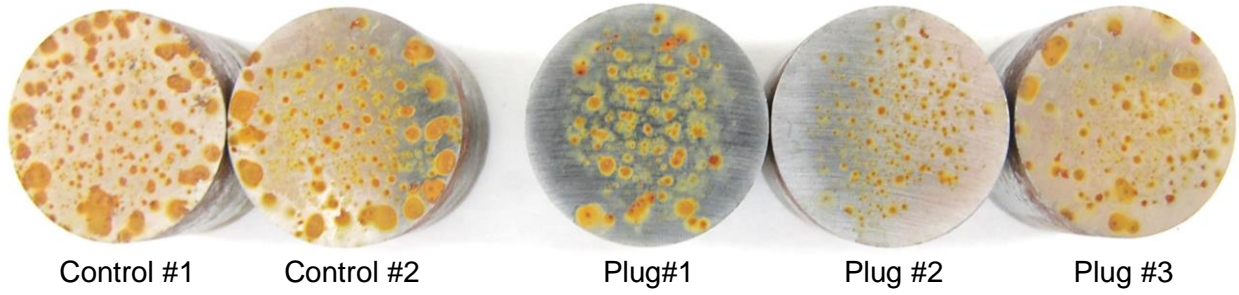
NACE VIA Test

Sample	Plug #1	Plug #2	Plug #3	End Result
Metpro Film	Grade 1	Grade 1	Grade 0	Fail
VpCI-126 Film*	Grade 3	Grade 3	Grade 2	Pass
Control	Grade 0	-	-	Fail

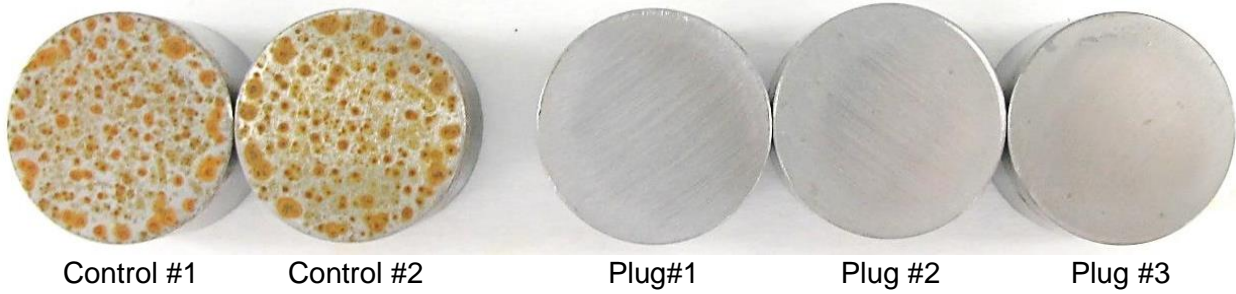
*Note- The results for VpCI-126 film used in this report was previously tested (from 16-083-1125)

Photo from the NACE VIA test:





Metpro Film, 4mils



VpCI-126 film, 4mils

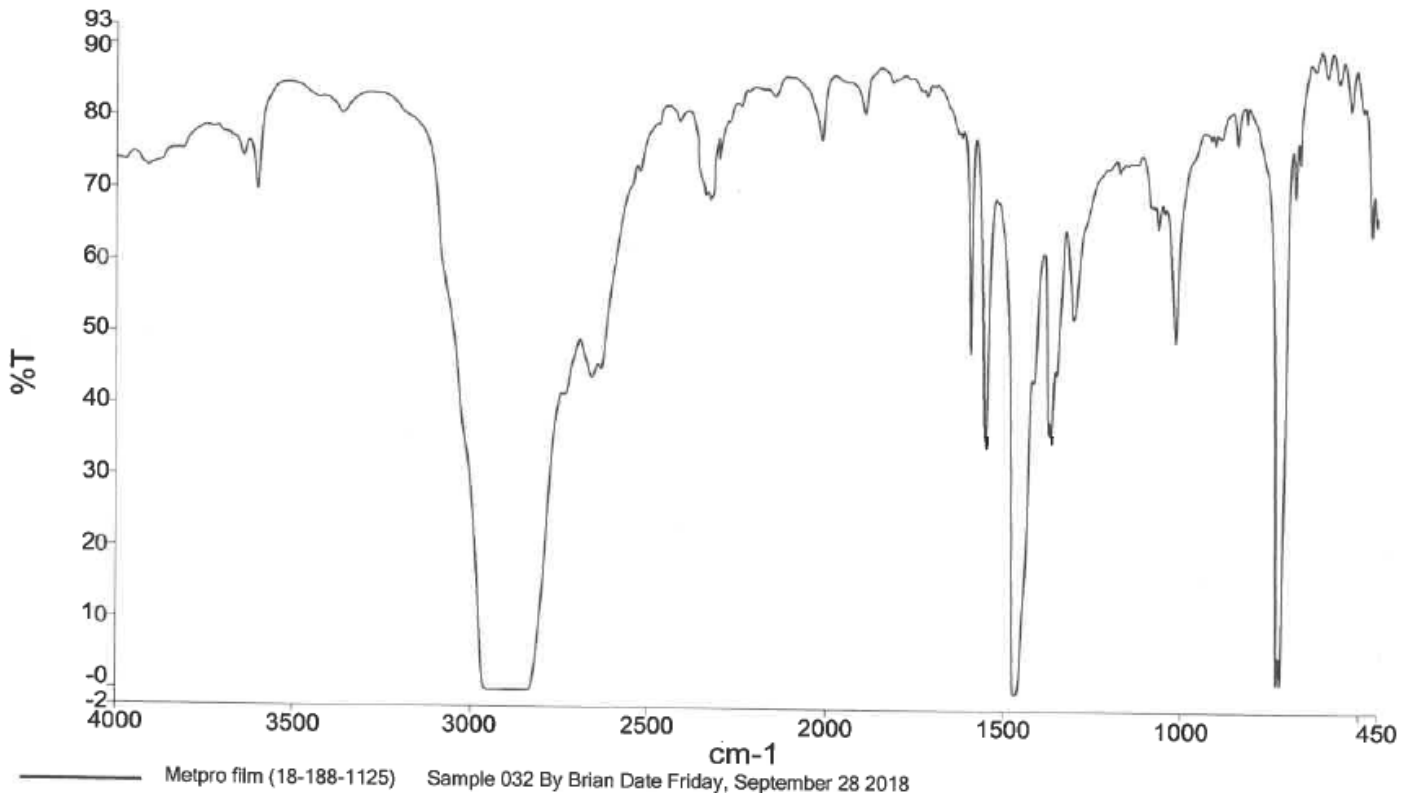


VIA Test Grades (Grade 2 or 3 are passing)
 All three plugs must be grade 2 or better to pass the test

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

FTIR Analysis:

Metpro Film



Interpretations:

The Metpro film previously used by the customer does not provide sufficient corrosion protection to pass the VIA or razor blade tests. Cortec's VpCI-126 film provides excellent corrosion protection in both the vapor phase and contact phase.