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Evaluation of Armor VCI Bags

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Background: Our customer is sending water pumps to CAT Lafayette and had a shipment rejected due to corrosion. The pumps are packaged in Armor VCI bags. Our customer would like to have the Armor film tested to eliminate or confirm it as a possible cause.

Samples Received: 1) Used Armor film from one of the rejected pumps
2) Unused Armor film from the same batch

Method: NACE Standard VIA Test, TM 0208-2018
Razor Blade Test, CC-004*
Nitrite/Nitrate Test*
*The tests marked are not covered under Cortec Laboratories, Inc. ISO 17025 Scope of Accreditation

Materials: VIA test kit (testing jars with lid apparatus, steel plugs, 400grit sandpaper)
Steel panels, SAE 1008/1010 (Q-Panel, S-35 DG, 3"x5"x0.032")
Glycerol (lot #W20E023)
Methanol, ACS grade (lot #18F066507)
Nitrite/Nitrate Test Strips (lot #HC719626)
DI water
Kimwipes

Procedure: For VIA testing, the procedure was followed according to the NACE VIA Test, TM0208-2018 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 razor blade testing followed according to standard procedure.

Results: The following results were found:

Nitrite/Nitrate Test Strips

Sample	Results
Used Armor film from one of the rejected pumps	Does not contain any nitrite/ nitrate
Unused Armor film from the same batch	Does not contain any nitrite/ nitrate

Razor Blade Test- Steel Panels

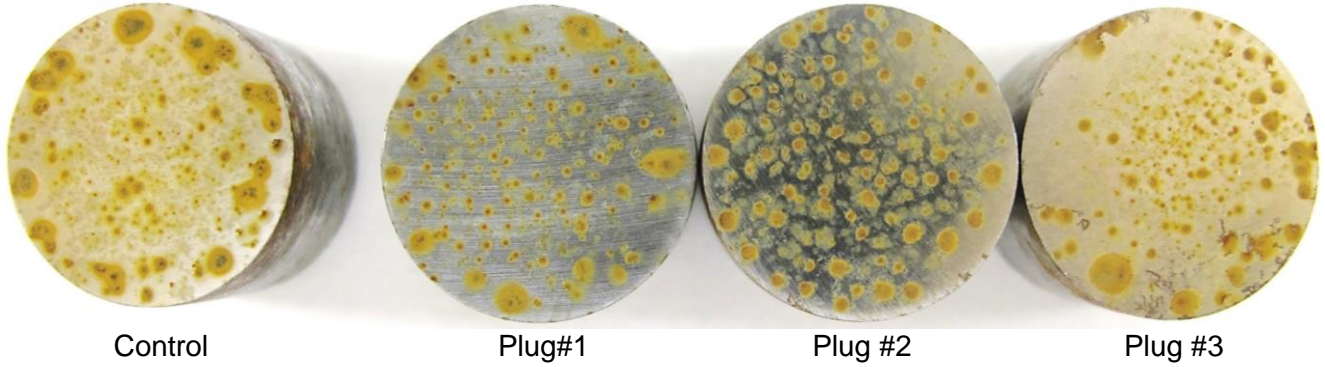
Film Sample	Panel #1	Panel #2	Panel #3	End Result
Used Armor film from one of the rejected pumps	Fail	Fail	Fail	Fail
Unused Armor film from the same batch	Fail	Fail	Fail	Fail
Control	Fail	-	-	Fail

NACE VIA Test

Sample	Plug #1	Plug #2	Plug #3	End Result
Used Armor film from one of the rejected pumps	Grade 0	Grade 0	Grade 0	No corrosion-protective effect
Unused Armor film from the same batch	Grade 1	Grade 0	Grade 0	Slight corrosion-protective effect
Control	Grade 0	-	-	No corrosion-protective effect

Photos from the NACE VIA test:

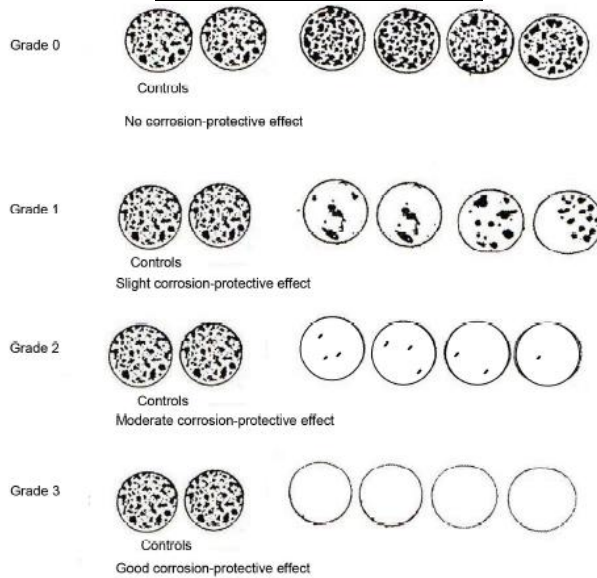
Used Armor film from one of the rejected pumps



Unused Armor film from the same batch



VIA Test Grades



Interpretations: The submitted Armor films from our customer do not provide sufficient contact corrosion protection to pass the razor blade test. Furthermore, the results of the NACE VIA test show that these Armor films provide very poor vapor phase corrosion protection.