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## *Comparing Rust Preventive Systems for Customer*

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**For:** Customer

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**Project #:** 14-107-1825.bis

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**Date:** August 7, 2014



**Background:** Customer currently uses Rust Veto 377 HF liquid and Armor VCI film as part of their process. They would like to evaluate these products, on steel coil samples (plates) and steel bushes, to similar Cortec systems.

**Sample Received:**

- 8 steel coil plates, with heat treatment marks on bare side and orange coating on opposite side.
- 54 cylindrical steel bushes, contaminated with dirt/oil.
- Non-VCI (clear) stretch film roll
- Armor VCI film bags (4-mil)
- Clear polyethylene (PE) film
- Rust Veto 377HF liquid

**Method:** ASTM D-1735 Water Fog Cabinet (100F, >95% humidity)  
CC-018

**Materials:** Samples from customer, as listed above.  
VpCI-126 Blue Film Zip Top Bags, 4-mil (Batch 310220)  
VpCI-126 Blue Film, 6-mil (Batch 410210)  
BioPad (Batch 13013)  
BioCorr (Batch 18493)  
EcoLine 3220 (Batch 04283)  
VpCI-418LM (Batch 06914)  
Deionized water

**Procedure:** The following procedure was used:

Bushes

- 1) All bushes were dipped in VpCI-418LM prior to testing, per test request.
  - a. VpCI-418LM was used at 10% concentration, by weight, in deionized water.
- 2) After 10 minutes, all bushes were removed from VpCI-418LM solution and allowed to air dry.
- 3) After drying, bushes were divided into 9 sets and prepared as follows, per customer test matrix:
  - a. Packed in clear PE bag.
  - b. Packed in Amor VCI bag, with clear PE bag over the Armor bag.
  - c. Packed in Armor VCI bag.
  - d. Packed in VpCI-126 bag (4-mil).
  - e. Packed in VpCI-126 bag (4-mil) with BioPad (1" square) inside.
  - f. Dipped in BioCorr, allowed to air dry, and then packed in VpCI-126 bag (4-mil).
  - g. Packed in VpCI-126 film (6-mil).

- h. Packed in VpCI-126 film (6-mil), with BioPad (1” square) inside.
  - i. Dipped in BioCorr, allowed to air dry, and then packed in VpCI-126 film (6-mil).
  - j. Note: Armor VCI film, non-VCI PE film, and VpCI-126 (6-mil) film were all closed via heat seal.
- 4) All bushes were allowed to condition in bags overnight.
  - 5) All bushes were then placed in ASTM D-1735 Water Fog cabinet.
  - 6) All bushes were visually inspected periodically.
  - 7) After 1032 hours, all bushes were removed from ASTM D-1735 testing.
  - 8) All bushes were unpacked, visually inspected, and photographed.

Steel Plates

- 1) Due to the large variation of surface finish on the steel plates upon receipt, no testing was performed.

**Results:** The following results were found:

<b>Bushes</b>	
<b>Rust Preventive System</b>	<b>Time to Corrosion (Hours)</b>
Non-VCI PE Film	144
Armor VCI Film + Non-VCI Film	NC
Armor VCI Film	144
VpCI-126 (4-mil)	NC
VpCI-126 (4) + BioPad	NC
VpCI-126 (4) + BioCorr	NC
VpCI-126 (6-mil)	NC
VpCI-126 (6) + BioPad	NC
VpCI-126 (6) + BioCorr	NC

NC – No corrosion after 1032 hours in ASTM D-1735 testing.

**Interpretations:** After 1032 hours of ASTM D-1735 testing, corrosion was only seen on two sets of bushings: the control (non-VCI PE) pack, and the pack with Armor VCI film. None of the other sets, whether 4- or 6-mil, had any corrosion.

The steel plates were all badly stained upon receipt, from heat treat (or another process), and the surface finishes were too variable to provide an accurate set of test results. Because of this, they were not tested.