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Comparing VpCI Packaging Films for Customer

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Project #: 13-039-1125.bis

Test conducted by:

A handwritten signature in black ink that reads "Eric Uutala".

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Approved by:

A handwritten signature in black ink that reads "M. Kharshan" followed by a horizontal line.

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Date: May 14, 2013



Background: Customer sent two bags of bi-metal bushings to Cortec for evaluation. The current protection system involves liquid rust preventive and Armor VCI bags. This system will be compared to VpCI-126 film and BioPad.

Sample Received: Dry Coat rust preventative
Armor VCI film bag

Method: ASTM D-1748 Environmental Cabinet (120°F, ~99% relative humidity)

Materials: Bi-metal bushings
Armor VCI film bag
Dry Coat rust preventative
VpCI-126 Blue film bags
BioPad
VpCI-416
Deionized water

Procedure: The following procedure was used:

- 1) Two bags of bushings were visually inspected prior to testing.
 - a. One of the bags contained parts that were almost all tarnished on the inside (copper) portion of the bushing. These parts were not tested.
- 2) After inspection, parts were broken into three groups of fifty bushings, and treated as follows:
 - a. Dipped in Dry Coat Rust Preventative (used as received), allowed to air dry, and then packed in Armor VCI bag, which was closed via heat seal.
 - b. Immersed for 5 minutes in 10% (by volume) VpCI-416 solution, allowed to air dry, and then packed in VpCI-126 Blue Film, which was closed via heat seal.
 - c. Immersed for 5 minutes in 10% (by volume) VpCI-416 solution, allowed to air dry, and then packed in VpCI-126 Blue Film, which was closed via heat seal.
 - i. A small (~2") square of BioPad was also added to this bag.
- 3) After packing, each bag was allowed to sit overnight in ambient laboratory conditions.
- 4) All bags were then placed in ASTM D-1748 cabinet.
- 5) Bushings were visually inspected periodically.
- 6) After 336 hours, bags were removed from ASTM D-1748 cabinet.
- 7) Bushings were unpacked, visually inspected, and photographed.

Results: The following results were found:

Protection System	Parts Corroded after 336 Hours
Dry Coat/Armor VCI Film	50/50
VpCI-416/VpCI-126	12/50
VpCI-416/VpCI-126/BioPad	5/50

*Per ASTM D-1748, corrosion is defined as 3 spots >1mm or 1 spot greater than 3mm.

Photos:



Figure 1: Bushings found to be corroded upon receipt. These parts were not tested.



Figure 2: Dry Coat/Armor VCI treated parts, after 336 hours of testing.



Figure 3: VpCI-416/126 treated parts, after 336 hours of testing.



Figure 4: VpCI-416/126/BioPad treated parts, after 336 hours of testing.

Interpretations: Two bags of bi-metal bushings were sent from customer. One bag contained hundreds of bushings that were tarnished (on the copper side) and, in some cases, corroded on both sides. The remaining bushings were dirty and/or oily. The bushings dipped in DryCoat and packed in Armor VCI film were not successfully protected, as every one corroded during 336 hours of ASTM D-1748 testing. Conversely, cleaning with VpCI-416 removed this contamination and provided increased corrosion protection. The addition of BioPad increased the protection even further.