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Evaluating Corrosion Preventive Systems for Customer

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Project #: 13-208-1125.bis

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Date: February 10, 2014

Background: Customer is in the process of implementing VpCI products into their process. They would like Cortec to verify which products are best, compared to the system they used previously.

Sample Received: -Armor VCI Film
-Armor Wrap 30R VCI Paper
-Four sets of machined bearings, three different sizes and shapes. Bearings were dipped in oil prior to shipping, and arrived packed in cardboard trays. Bearings were stamped as follows:

1) F611
   10 13
   12639437
   This information was stamped on one end of the bearing. The other end was stamped with one of the following:

   A860 – 3 bearings
   B362 – 9 bearings
   C362 – 12 bearings
   B858 – 3 bearings

2) 10 13
   12651909
   This information was stamped on one end of the bearing. The other end was stamped with one of the following:

   A1 – 1 bearing
   B1 – 25 bearings

3) 12651924
   F511
   10 13
   This information was stamped on one end of the bearing. The other end was stamped with B150. 24 bearings were in this set.

Method: ASTM D-1735 Water Fog Cabinet

Materials: Four sets of machined metal bearings, as described above
Armor Poly VCI Film
Armor Wrap VCI 30R Paper
VpCI-126 Blue Film (Batch #310220)
VpCI-146 Paper
VpCI-377 (Batch #01663)
BioCorr (Batch #13013)
Laboratory grade methanol
Non-VCI polyethylene (PE) film zip top bags

Procedure: The following procedure was used:

1) Four sets of bearings were received from customer.
    a. One set of bearings were all metal, with steel and aluminum surfaces. These bearings will be referred to as 12651924.
    b. Three sets of bearings were steel with a red coated layer on the inside. These bearings will be referred to as 12639437 and 12651909, respectively.
2) Test setup was as follows:
    a. All bearing types packed in Armor film and paper.
    b. All bearing types packed in VpCI-126 and VpCI-146.
    c. All bearing types cleaned with methanol, dipped in VpCI-377 (used at 10% concentration in deionized water, by volume), and then packed with VpCI-146 paper and VpCI-126 Blue film.
3) After setup, all bearings were placed in ASTM D-1735 water fog cabinet.
4) All bearings were visually inspected periodically.
5) After 600 hours, all bearings were removed from ASTM D-1735 water fog cabinet.
6) All bearings were unpacked, visually inspected, and photographed.

Results: The following results were found:

Corrosion Preventive System/Bearing	# of Corroded Bearings
Armor VCI/12651924	7/8
VpCI-146, 126/12651924	4/8
VpCI-377, 146, 126/12651924	1/8
Armor VCI/12639437	6/8
VpCI-146, 126/12639437	3/8
VpCI-377, 146, 126/12639437	0/8
Armor VCI/12651909	7/8
VpCI-146, 126/12651909	2/8
VpCI-377, 146, 126/12651909	0/8

Interpretations: After 600 hours of ASTM D-1735 testing, the combination of VpCI-377, VpCI-146, and VpCI-126 provided the best corrosion protection.