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Evaluating Rust Preventive Liquids on Clutch Plates from Customer

To: Cortec Corporation

For: Customer

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Project #: 15-260-1825.bis

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Background: Customer is in the distribution of transmission-related friction products for automotive, heavy duty equipment, and racing industries. Customer would like to evaluate the rust preventive performance of Kyzen CP90D, and have it compared to similar Cortec products.

Sample Received: -4 steel clutch plates
-Kyzen CP90D rust preventive liquid, received in a 500ml glass jar, in good condition.
-Finishing Technology VBS 186 cleaner (not used for this test), received in a 500ml glass jar, in good condition.

Method: ASTM D-1735 Water Fog testing.

Materials: 4 clutch plates
Kyzen CP90D rust preventive liquid
VpCI-325 (batch #05485)
VpCI-329D (batch #21284)
Laboratory grade methanol

Procedure: The following procedure was used:

1) All clutch plates were visually inspected upon receipt. Clutch plates were then wiped with methanol and allowed to air dry.
2) Clutch plates were then treated as follows:
    a. 15-260-A – No treatment (control)
    b. 15-260-B – Dipped in Kyzen CP90D
    c. 15-260-C – Dipped in VpCI-325
    d. 15-260-D – Dipped in VpCI-329D
3) All clutch plates were then hung to drip dry overnight.
4) All clutch plates were then hung in ASTM D-1735 water fog cabinet.
5) Clutch plates were visually inspected periodically.
6) After 624 hours, all clutch plates were removed from ASTM D-1735 water fog cabinet.
7) Clutch plates were visually inspected and photographed.

Results: The following results were found:

Metal Treatment	Time to Corrosion (Hours)
A - None (Control)	24
B - Kyzen CP90D	460
C - VpCI-325	624
D - VpCI-329D	528

Photos:

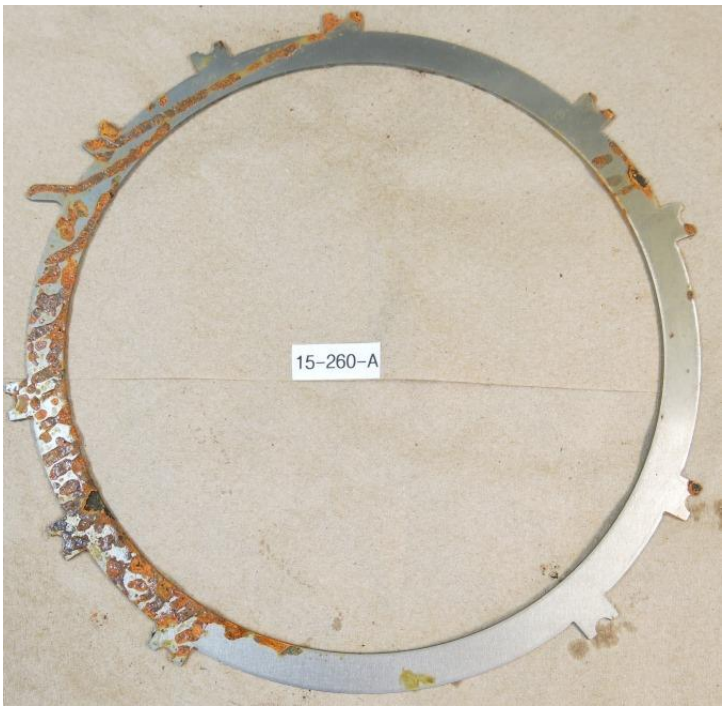

Figure 1: Control clutch plate, after 624 hours of testing.

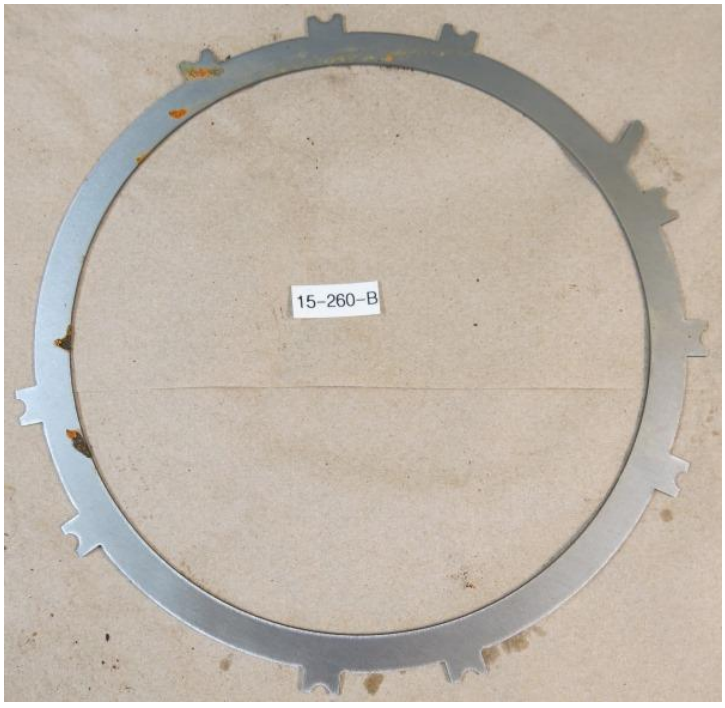

Figure 2: Kyzen CP90D treated clutch plate, after 624 hours of testing.

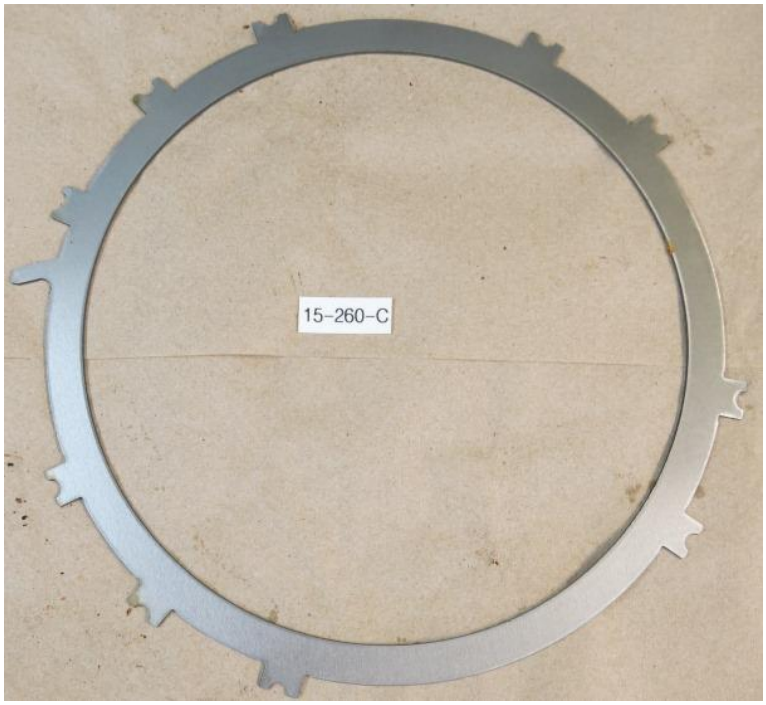

Figure 3: VpCI-325 treated clutch plate, after 624 hours of testing.

Figure 4: VpCI-329D treated clutch plate, after 624 hours in testing.

Interpretations: After 624 hours in ASTM D-1735 Water Fog testing, VpCI-325 was the most effective rust preventive solution for clutch plates from customer. VpCI-329D was also more effective than the incumbent solution, Kyzen CP90D.