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***Comparison of Cortec and Commercially Available
Cleaner-Degreasers***

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Background: It was requested that testing be completed to compare commercially available cleaner-degreasers to Cortec products. The cleaning efficiency of the product will be tested along with corrosion protection.

Materials: EcoAir VpCI-414
CorrClean VpCI-415
EcoSpray VpCI-416
Competitor Cleaner-Degreaser 1
Competitor Cleaner-Degreaser 2
Laboratory Grade Methanol
1010 Carbon Steel Test Panels
Deionized Water
VpCI-369

Method: ASTM D-1748 (120 °F and ~99% relative humidity)
ASTM G-121 Method A
ASTM G-122

Procedure: The following procedures were used:

ASTM G-121

- 1) Clean 6 carbon steel test panels with methanol and wipe dry with lint-free wipe.
- 2) Label the backside of each test panel with a number 1 through 6 and then record the mass of each panel in grams.
- 3) Coat all 6 panels with VpCI-369 by brush application in a method to create a consistent coating.
- 4) Let the test panels sit overnight to dry.
- 5) Record the mass of each test panel now that it has been coated.

ASTM G-122

- 6) Immediately after completion of ASTM G-121, apply each cleaner by spraying on to the surface of the test panel until fully coated.
- 7) Allow each test panel to sit for 5 minutes, allowing the cleaner to dwell on the coating.
- 8) Immerse each test panel in a beaker of deionized water being agitated by stir bar at a constant rate.
- 9) After 1 minute of immersion, remove each test panel and hang to dry overnight.
- 10) Record the final mass of each test panel to determine the total amount of coating removed.

ASTM D-1748

- 11) Clean 6 carbon steel test panels with methanol and wipe dry with a lint-free wipe.
- 12) Apply each of the following products by spraying on to both sides of the test panel.
 - a. EcoAir VpCI-414
 - b. CorrClean VpCI-415
 - c. EcoSpray VpCI-416
 - d. Competitor Cleaner-Degreaser 1
 - e. Competitor Cleaner-Degreaser 2
 - f. Deionized water in spray bottle
- 13) Using plastic coated wire hooks, allow the test panels to hang and dry overnight.
- 14) Hang each of the 6 panels in the ASTM D-1748 humidity cabinet.
- 15) Visually inspect the test panels hourly for corrosion failure
 - a. Failure is determined by 3 spots of visual corrosion
- 16) Remove the panels from the test chamber after 24 hours and photograph

Results:

The following results were found:

Table 1: Results of ASTM G-121 and G-122

Cleaner	Panel Mass (grams)	Coated Mass (grams)	Final Mass (grams)	Percent Removal
Competitor 1	60.82	61.45	60.84	97%
VpCI-416	60.43	61.00	60.91	16%
VpCI-414	61.05	61.71	61.11	91%
DI Water	60.53	61.08	61.07	2%
Competitor 2	60.33	60.97	60.34	98%
VpCI-415	60.76	62.51	60.88	84%

Note: Percent removal determined by fraction of coating that was removed

Table 1: Results of ASTM D-1748 Testing

Rust Preventative Used	Time to Failure
EcoAir VpCI-414	8 hours < Time < 24 hours
EcoSpray VpCI-416	~ 24 hours
CorrClean VpCI-415	8 hours < Time < 24 hours
Competitor Cleaner-Degreaser 2	< 1 hour
Deionized Water (Control)	4 hours
Competitor Cleaner-Degreaser 1	< 1 hour

Note: VpCI-414 and VpCI-415 reach corrosion failure overnight

Interpretations:

The testing conducted shows a considerable difference between Cortec and commercial cleaner-degreaser products. All Cortec products inhibited corrosion, while the competitor products caused the test panels to become more corroded than the control. Cortec product VpCI-416 provided the best corrosion protection as visual corrosion was not evident until 24 hours of ASTM D-1748 testing. These results are further evident in the photo section below.

VpCI-414 had the best cleaning efficiency (91%) of the Cortec products, based on the ASTM G-122 test. The commercial cleaner-degreasers had a slightly higher cleaning efficiency than any of the Cortec products, but this is expected because the high quantity of solvents used in the cleaner. These products have a high VOC content and are very flammable. The Cortec cleaner-degreasers tested are water based, making them safer to use.

It should be noted that the results from the cleaning efficiency test are limited by the use of only VpCI-369 as a surface coating. Products like VpCI-416 are typically not used for quick removal of heavy coatings like VpCI-369, which is reflected in its low cleaning efficiency in this specific test. Future work should be completed to evaluate the cleaning efficiency with different coating types and varying concentrations of the cleaner.

Photos: Photo below taken after 24 hours of ASTM D-1748 testing:

