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Comparing Corrosion Protection of Various **Products on Copper Strip**

Purpose: Compare Coppershield product currently used by customer to similar Cortec products for

protection of copper strip.

Method: ASTM D-1748 Humidity cabinet

Materials: 3 copper strips

> Henkel Coppershield VpCI-239 liquid VpCI-316

DI (Deionized) water

Procedure: The following procedure was used:

1) The copper strips were all cleaned with methanol prior to testing.

After cleaning, the strips were dipped in one of the following solutions:

a. Coppershield, used as received (4.5% solution, according to the bottle)

b. VpCI-239, used neat

VpCI-316, used at 5% in DI water.

- 3) All pieces were dipped for ~2 seconds, according to customer specification.
- 4) After dip, all strips were allowed to drip dry.
- 5) After drying, strips were placed in ASTM D-1748 humidity cabinet.
- 6) Strips were visually inspected periodically.
- 7) After 312 hours, all strips were removed from ASTM D-1748 humidity cabinet.
- Parts were visually inspected and photographed.

Results: The following results were found:

Protection	Time to Failure (Hours)
Coppershield (4.5%)	<72
VpCI-239	DNF
VpCI-316 (5%)	DNF

DNF – Did not fail during 312 hours of testing.



There were problems with the Coppershield product even before humidity testing began. Within 30 minutes of application, the copper strip dipped in the Coppershield product had turned light green over ~25% of its total surface area. This green color turned to black as testing progressed.

No corrosion was seen on either of the Cortec products. Previous testing indicates that VpCI-239 also effectively protects copper in SO2 conditions.

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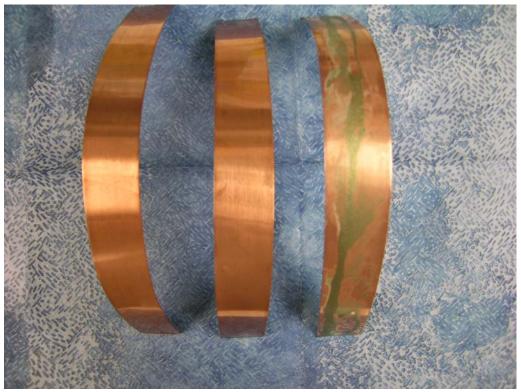


Figure 1: Copper strips, after dipping, prior to testing. From left to right: VpCI-239, VpCI-316, Coppershield.



Figure 2: Copper strip dipped in Coppershield (4.5% solution), after 312 hours in ASTM D-1748 humidity cabinet testing.



Figure 3: Copper strip dipped in VpCI-239, after 312 hours in ASTM D-1748 humidity cabinet testing.



Figure 4: Copper strip dipped in VpCI-316 (5% solution), after 312 hours in ASTM D-1748 humidity cabinet testing.