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Comparing the Corrosion Protection of Cutting Fluids

Purpose: To compare the corrosion inhibiting abilities of VpCI-345 to the Metal Seal product.

Method: ASTM D-1748 Humidity Cabinet

Materials: 3 Keyways
KO Manufacturing 'Metal Seal'
VpCI-345
Lab Grade Methanol
VpCI-416

Procedure: The following procedure was used:

- 1) The 3 keyways were cleaned prior to testing.
 - a. Two of the keyways were cleaned using methanol.
 - b. The third keyway was cleaned in a 5% solution of VpCI-416.
- 2) After cleaning, each part was allowed to air dry.
- 3) After drying, the parts were prepared as follows:
 - a. The first part was left untreated, to be tested as a control.
 - b. The second part was dipped in Metal Seal, which was used as received (4.5%, according to the customer).
 - c. The third part was dipped in a 5% solution of VpCI-345.
- 4) After dipping, all parts were allowed to air dry.
- 5) Parts were then placed in ASTM D-1748 humidity cabinet.
- 6) Parts were visually inspected periodically.
- 7) After 312 hours, all parts were removed from ASTM D-1748 humidity cabinet.
- 8) All parts were visually inspected and photographed.

Results: The following results were found:

Protection	Time to Failure (Hours)
None (Control)	<6
'Metal Seal'	<8
VpCI-345 (5%)	312

Conclusion: Humidity testing provided drastic corrosion protection results. The keyway dipped in the Metal Seal fluid started to corrode within 8 hours, and it was almost completely covered in corrosion after 312 hours of testing. VpCI-345 did not corrode at all for the first 300+ hours of testing. These results are to be expected considering the Metal Seal product uses an old VCI chemistry, while VpCI-345 uses a combination of newer, more effective inhibitors.



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Figure 1: Three keyways after 312 hours in ASTM D-1748 Humidity cabinet testing. From left to right: control, Metal Seal, VpCI-345.