



4119 White Bear Parkway, St. Paul, MN 55110 USA
Phone (651) 429-1100, Fax (651) 429-1122
Toll Free (800) 4-CORTEC, E-mail info@cortecvci.com
Internet http://www.cortecvci.com

Evaluation and Recommendation of Cortec Additives to Hydraulic Fluid and Cutting Fluid for Customer

Background: Hydraulic Fluid and Cutting Fluid samples were sent by customer for recommendation of the best additives for corrosion protection.

The Hydraulic Fluid, Castrol Blue Hydraulic Plus 46 manufactured by BP, contains 95-100% highly refined base oil. PAR-KOOL SS387 LF and 92% water. PAR-KOOL SS 387 LF (manufactured by Parent Petroleum, Inc) is a high oil semi-synthetic micro emulsion. It is alkaline and contains 5-10% Triethanolamine and 1-3% Monoethanolamine.

Purpose: Evaluate and recommend the best additives for the above samples.

Materials:

- 1) Submitted hydraulic fluid sample
- 2) Submitted PAR-KOOL cutting fluid sample
- 3) Carbon Steel Panels
- 4) Methanol-lab grade
- 5) Cortec M-530
- 6) Cortec M-528
- 7) Cortec M-95
- 8) Cortec M-370

Method: ASTM D 1748 (Humidity Cabinet at 50°C, RH 99%)

Procedure:

- 1) Make solution of 3% M-530 in the submitted hydraulic fluid sample.
- 2) Make solutions of 1% M-95, 1% M-528, 5% M-528, 2% M-370, and 3% M-370 in the submitted PAR-KOOL cutting fluid sample, respectively.
- 3) Observe compatibility of the above solutions, also the submitted samples (as controls).
- 4) Clean the carbon steel panels with methanol.
- 5) Coat the cleaned carbon steel panels with the above solutions, also the submitted samples (as controls), respectively. Let air dry overnight, and subject them to Humidity Cabinet. Observe the panels daily for signs of corrosion.



Results:Compatibility Observation

Material	Compatibility at Room Temperature	Compatibility at 40°C, 48hrs
3% M-530 in Castrol Blue Hydraulic Fluid	Compatible	Compatible
Castrol Blue Hydraulic Fluid (control)	---	---
PAR-KOOL Cutting Fluid (control)	Stable emulsion	Separated; but emulsified again when stirred
1% M-95 in PAR-KOOL Cutting Fluid	Stable emulsion	Separated; but emulsified again when stirred
1% M-528 in PAR-KOOL Cutting Fluid	Stable emulsion	Stable emulsion
5% M-528 in PAR-KOOL Cutting Fluid	Stable emulsion	Stable emulsion
3% M-370 in PAR-KOOL Cutting Fluid	Stable emulsion	Stable emulsion

ASTM D 1748 (4 days)

Material	Corrosion Observation
3% M-530 in Hydraulic Fluid	No sign of corrosion
Hydraulic Fluid (control)	Corrosion
1% M-95 in PAR-KOOL Cutting Fluid	No sign of corrosion
1% M-528 in PAR-KOOL Cutting Fluid	No sign of corrosion
5% M-528 in PAR-KOOL Cutting Fluid	No sign of corrosion
2% M-370 in PAR-KOOL Cutting Fluid	Signs of corrosion
3% M-370 in PAR-KOOL Cutting Fluid	No sign of corrosion
PAR-KOOL Cutting Fluid (control)	Corrosion after 1 day

ASTM D 1748 (4 days) – Hydraulic Fluid (L) and 3% M-530 (R)



ASTM D 1748 (4 days) – PAR-KOOL (L), 1% M-528(M),1% M-95 (R)



ASTM D 1748 (4 days) – 2% M-370 (L), 3% M-370(M),5% M-528 (R)



Conclusion:

For Hydraulic Fluid, addition of 3% of M-530 provided corrosion protection in 50°C, 99% RH Humidity Cabinet for 4+ days; it is also compatible to the Hydraulic Fluid. Thus, 3% of Cortec M-530 is recommended as additive for corrosion protection.

For PAR-KOOL Cutting Fluid Sample, 1% M-95, 1% M-528, and 3% M-370 all provided excellent corrosion protection in 50°C, 99% RH Humidity Cabinet for 4+ days. In addition, M-528 and M-370 also added emulsion stability of the PAR-KOOL Cutting Fluid sample. The customer can choose any of the above options as anti-corrosion additive.

Project #: 09-276-1325(bis)

From: Ming Shen

Date: February 15, 2010

cc: Boris Miksic
Anna Vignetti
Rita Kharshan
Mike Morin