



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

Evaluating VpCI-705 According to MIL-PRF-25017F: Part 3 Compatibility and Preliminary Report on Storage Stability

Background: A request was made to evaluate VpCI-705 in accordance with the storage stability test found in section 4.4.10 of MIL-PRF-25017F and the compatibility test found in section 4.4.2. The Storage Stability test began November 6, 2007 and runs for 12 months. This is a preliminary report documenting the progress of the storage stability test thus far.

Purpose: Determine if VpCI-705 complies with the 4.4.10 Storage Stability Test from MIL-PRF-25017F.

Method:

- 1) 4.4.10 Storage Stability Test: MIL-PRF-25017E Inhibitor, Corrosion/Lubricity Improver, Fuel Soluble.
- 2) 4.4.2.1 Compatibility Test, Other Inhibitors: MIL-PRF-25017E Inhibitor, Corrosion/Lubricity Improver, Fuel Soluble.

Materials:

A) Storage Stability Test:

- 1) VpCI-705
- 2) Two 800 mL glass jars with plastic screw cap
- 3) Two 5 gallon metal pails with metal lids

B) Compatibility Test:

- 1) VpCI-705, B# 03387
- 2) Diesel fuel, ultra low sulfur #2 winter blend
- 3) Kerosene
- 4) Isooctane
- 5) 8 oz glass jar with plastic screw lids
- 6) Tolad 351
- 7) Tolad 4410
- 8) Nalco 5403
- 9) Nalco 5405

Procedure:

A) Storage Stability Test:

1. Two 800 mL glass jars were each filled with 400 mL of VpCI-705, and tightly capped with a screw cap.



2. One jar was placed into the 5 gallon metal pail and labeled: Do Not Open Until 11/06/08.
3. The other jar was placed into a 5 gallon metal pail and labeled: Open Weekly.
4. The bottles were then stored next to each other, in an upright position, indoors and away from sunlight, and kept at $70^{\circ} \pm 5^{\circ}\text{F}$.
5. The jar in the pail labeled Open Weekly was carefully removed from the pail each week, and inspected visually for precipitation, separation into layers, or other evidence of gross separation.
6. After 1 year, on 11/06/08 VpCI-705 will be removed from the pail labeled: Do Not Open Until 11/06/08 and visually inspected for precipitation, separation into layers, or other evidence of gross separation.

B) Compatibility Test:

1. The following solutions were made, using the maximum amount allowable of the products from the QPL 25017-22:
 - a) 250 mL of 36ppm VpCI-705 in kerosene.
 - b) 50 mL of 24 g/m^3 of Tolad 351 in kerosene.
 - c) 50 mL of 22.5g/m^3 of Tolad 4410 in kerosene.
 - d) 50 mL of 22.5g/m^3 of Nalco 5403 in kerosene.
 - e) 50 mL of 11g/m^3 of Nalco 5405 in kerosene.
 - f) All of the solutions per letters a-e were repeated using diesel fuel and isooctane instead of kerosene
2. 50 mL of solutions (per letters b-e in step 1) were poured into their own 8 oz jars.
3. 50 mL of 36 ppm 705 was poured into each of the jars listed per step 2.
4. After 24 hours, the samples were visually inspected for precipitation, cloudiness, or other evidence of incompatibility.
5. Steps 2-5 were repeated using the samples made with diesel and the samples made with isooctane.

Results:

A. Storage Stability Test:

As of 5/28/2008 the VpCI-705 that is being checked weekly has displayed no separation or other characteristics of instability.

B. Compatibility Test:

Solvent	QPL 25017 Inhibitor	Incompatibility/Separation (After 24 hours)
Kerosene	Nalco 5403	None
Kerosene	Nalco 5405	None
Kerosene	T-4410	None
Kerosene	T-351	None
Diesel	Nalco 5403	None
Diesel	Nalco 5405	None
Diesel	T-4410	None

Diesel	T-351	None
Isooctane	Nalco 5403	None
Isooctane	Nalco 5405	None
Isooctane	T-4410	None
Isooctane	T-351	None

Conclusion: The test results have determined that VpCI-705 is compatible with the products Tolad 351, Tolad 4410, Nalco 5403 and Nalco 5405.

The storage stability results have determined that as of May 28, 2008 VpCI-705 has no stability issues. The test will be completed 11/06/08 and final results will be made available then.

Part 3 of this report is finalizing all the testing done to conclude that VpCI-705 is ready to QPL testing (after decision will be made).

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