

Rust preventing characteristics of VpCI-705 in diesel fuel when exposed to sea water (MIL-PRF-25017F) (Part 1)

Background: Cortec wanted to evaluate how well VpCI-705 would inhibit corrosion in diesel oil when exposed to sea water. It should be done using standard military test methods (MIL-PRF-25017F).

Purpose: Determine the lowest concentration of VpCI-705 in diesel oil that will inhibit corrosion when exposed to sea water.

Method: MIL-PRF-25017F “Inhibitor, Corrosion/Lubricity Improver, Fuel Soluble”, 4.4.3.1. Rusting “Test Method”

Materials: Steel Cylinder Specimen (11mm x 9mm)
 Diesel Fuel
 Sand
 VpCI-705
 Artificial Sea Water
 Rusting Test Method kit

Procedure: The above test was performed according to standard procedures.

1. Artificial Sea Water was prepared as follows in DI water:

Salt	Concentration (mg/l)
KBr	100
KCl	700
CaCl ₂ 2H ₂ O	1470
Na ₂ SO ₄	4000
MgCl ₂ 6 H ₂ O	10780
NaCl	23500

2. Sand bath was prepared by adding sand to cooking pot and heated to 38.0°C ± .5°C on hot plate.
3. 300 ml of diesel fuel was added (with desired amount of inhibitor) to 400 ml Berzelius-type beaker.
4. 2 holes (1 cm diameter) were drilled into a plastic lid that fit over the top of the beaker. The center hole was 3 1/2 inches from edge of lid. The 2nd hole was made 1 cm from the hole in the center.



5. Beaker with diesel sample was then placed into the sand bath. The thermometer was placed into the 2nd hole.
6. When the diesel sample reached 38.0°C± .5°C the steel specimen was inserted for 10 minute static soak, and then a 20 minute dynamic soak using a magnetic stirrer.
7. The lid was removed and 30 ml of artificial sea water was added to the diesel sample.
8. After 5 hours the steel specimen was removed and cleaned with methanol.

Results:

VpCI-705 in Diesel

Sample	Spots of corrosion <1 mm	Spots of corrosion >1 mm	Pass/Fail
Control	>20	1	Fail
36ppm	0	0	Pass
8ppm	0	0	Pass
4ppm	>6	0	Fail

Conclusion: The test concluded that the lowest concentration of VpCI-705 that effectively inhibited corrosion in the presence of sea water is 8ppm.
Note: The second part of this report will include all other data in accordance to MIL-PRF-25017F.

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Interpretation of test results

A test shall be reported failed if the specimen shows 6 or more rust spots of any size or if it shows any rust spot 1 mm in diameter or larger.