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LABORATORY ACCREDITATION BUREAU
ACCREDITED ISO/IEC 17025
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Evaluating Customer Coolant for Additive Recommendation

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Background: A bottle of coolant from customer was received for recommendation of inhibitor additive. The coolant is water based, and currently contains 7%±1% of additive CIMCOOL CIMSTAR S2-EF.

Sample Received: A bottle of pink-colored liquid, approx 400ml. The MSDS of CIMCOOL CIMSTAR S2-EF was received on May 11, 2011.

Method:

Cast Iron Chip Test (ASTM D 4627)
Humidity Cabinet (ASTM 1748: 50°C, 100% RH)

Materials:

Sample Coolant from cusotmer
M-250
EcoLine Cutting Fluid
Gray Cast Iron Drilling Chips
Glass-fiber Filter Paper (3.2 diameter, Whatman)
Petri Dishes with lids (35x10mm, Falcon)
Synthetic Hard Water Stock (2.93g $CaCl_2.2H_20$ in 100 g freshly boiled DI-water)
Carbon Steel Panels
Cast Iron Panel
Methanol (lab grade)

Procedure:

1. Synthetic Hard Water was made by diluting 0.5% of Synthetic Hard Water Stock in DI-water.
2. 10% dilution of sample coolant in Synthetic Hard Water was made.
3. Additives were added at various concentrations to the sample coolant as received.
4. Additives were added at various concentrations to the 10% dilution of sample coolant.
5. Cast Iron Chip Tests (ASTM 4627) were performed on sample coolant, and on sample coolant with various additives.
6. Cast Iron Chip Tests were also performed on 10% dilution of sample coolant, and on that with various additives.
7. Carbon Steel panels were cleaned with Methanol, dipped in sample coolant and that with various additives, allowed to dry overnight, and placed in 38°C, 100% RH Humidity Cabinet. The panels were observed periodically for any sign of corrosion.
8. Cast Iron panel was cleaned with Methanol, dipped in the sample coolant and allowed to dry, and placed in 50°C, 100% RH Humidity Cabinet. The panel was observed periodically for any sign of corrosion.

Results:

Cast Iron Chip Tests on Sample Coolant As/received and with M250 (ASTM D4627)

Inhibitor	M250			Blank 1 (sample coolant as/received)
Conc of Inhibitor in Blank 1	0.5%	0.75%	1%	--
Sign of corrosion Stain on Filter Paper	No	No	No	No

Cast Iron Chip Tests on 10% Sample Coolant Dilution in Synthetic Hard Water and with M250 (ASTM D4627)

Inhibitor	M250			Blank 2 (10% Dilution of Sample Coolant in Syn. Hard Water)
Conc of Inhibitor in Blank 2	0.5%	0.75%	1%	--
Sign of corrosion Stain on Filter Paper	Very Slight corrosion	No corrosion	No corrosion	Moderate to Heavy corrosion

Humidity Cabinet (ASTM 1748)

Conc of Inhibitor in Blank1	Hours to Corrosion
2% M250 on Carbon Steel	Light Corrosion <8 hrs
Blank 1 (Sample Coolant As Received) - on Carbon Steel	Light Corrosion <8 hrs
Blank 1 (Sample Coolant As Received) – on Cast Iron	Heavy Corrosion <3.5hrs

Interpretations:

1. The coolant by itself is passing the cast iron chip test (ASTM 4627), however when 10% of this coolant was tested in hard water (according to ASTM 4327) the product didn't pass the test.

2. Addition of M250 at 0.75-1% provides corrosion prevention to the current coolant.

Furthermore, we recommend Cortec EcoLine Cutting Fluid for this application. 2.5-5% of EcoLine Cutting Fluid is recommended to be added to water for use as coolant with corrosion protection ability. In addition to being a "greener" product based on renewable soy-bean oil, EcoLine Cutting Fluid also provides protection at a lower dosage than CIMCOOL CIMSTAR S2-EF. EcoLine Cutting Fluid provides a very good corrosion protection after the application as a coolant as well. The typical results of EcoLine Cutting Fluid, as well as performance comparison with CIMCOOL CIMSTAR S2-EF, are included in the following tables:

Typical Results on Cortec EcoLine Cutting Fluid

Humidity Test on Carbon Steel (ASTM 1748: 100%RH, 50°C)		**Iron Chip Test (ASTM 4627)**	
Conc of EcoLine Cutting Fluid in DI Water	Hours to Corrosion	Conc of EcoLine Cutting Fluid in Synthetic Hard Water	Sign of Corrosion Stain on Filter Paper
2.5%	220 hrs	1%	No
5%	>500 hrs	2.5%	No

Performance Comparison of EcoLine Cutting Fluid vs CIMCOOL CIMSTAR S2-EF

Protection	**EcoLine Cutting Fluid**	**CIMCOOL CIMSTAR S2-EF**
Cast Iron Chip Test (ASTM 4627)	Pass @1%	Pass @7%
Humidity Cabinet for carbon steel (100%RH, 50°C)	>220hrs @2.5%	<8hrs @7%