Report of ASTM Coolant Performance Test

D 1384-05

Standard Test Method for Corrosion Test for Engine Coolants in Glassware

Dober In-House Test (Method adapted from ASTM D 1384-05 text)
Prepared by: Sandra Cupic

Coolant Identification	**Test Date**
LD OAT D17 EG 50/50 Premix of pH 8.31	**6/19/14 to 7/03/14**

This test method covers a simple beaker-type procedure for evaluating the effects of engine coolants on metal specimens under controlled laboratory conditions. In this test method, specimens of metals typical of those present in engine cooling systems are totally immersed in aerated engine coolant solutions for 336 h at 88ºC (190ºF.) The corrosion-inhibitive properties of the test solution are evaluated based on the weight changes incurred by the specimens. Each test is run in triplicate, and the average weight change is determined for each metal.

This test method will generally distinguish between coolants that are definitely deleterious from the corrosion standpoint and those that are suitable for further evaluation. However, the results of this test method cannot stand alone as evidence of satisfactory corrosion inhibition. Only more comprehensive bench, dynamometer, and field tests can determine the actual service value of an engine coolant formulation.

Automobile manufacturers have accepted the specimens prescribed in this test method, but their composition may not be the same as that of alloys currently used for engine cooling system components. Therefore, specimens other than those designated in this test method may be used by mutual agreement of the parties involved.

The following metal test specimens were used:

1. ***Steel***, UNS G10200 (SAE 1020), Chemical composition of the carbon steel is as follows: carbon, 0.17 to 0.23 %; manganese, 0.30 to 0.60 %; phosphorus, 0.040 % maximum; sulfur, 0.050 % maximum.
2. ***Copper***, conforming to UNS C11000 (SAE CA110) or UNS C11300 (SAE CA113). Cold-rolled.
3. ***Brass***, conforming to Alloy UNS C26000 (SAE CA 260).
4. ***Solder,*** A brass specimen coated with solder conforming to Alloy Grade 30A (SAE 3A)
5. ***Cast Aluminum***, conforming to Alloy UNS A23190 (SAE 329).
6. ***Cast Iron***, conforming to Alloy UNS F10007 (SAE G3500).

Preparation of Test Solution

The Test Solution was prepared as follows:

1. 1200 mL *LD OAT D17 EG 50/50 Premix of pH 8.31* was added into a 2000-mL beaker.
2. With mixing, 600 mL *DI water* was added; maintained good mixing.
3. Na_2SO_4 **0.178 g**, NaCl **0.198 g**, and $NaHCO_3$ **0.166 g**, were added.
4. Mixed for 2 hours for complete dissolution.
5. The solution was covered overnight.

Results and Discussion

LD OAT D17 EG 50/50 Premix of pH 8.31

Test Results (mg)

Metal	Beaker 1 (mg)	Beaker 2 (mg)	**Average** (mg)	**ASTM Limit*** (mg)
Copper	0.23	-0.17	0.03	10
Solder	1.27	0.67	0.97	30
Brass	-0.70	0.10	-0.30	10
Steel	0.00	-0.70	-0.35	10
Iron	-0.83	-1.13	-0.98	10
Aluminum	5.30	6.70	6.00	30
pH Before	8.15	8.15		
pH After	7.81	8.03		
Appearance Before	Colorless; Clear	Colorless; Clear		
Appearance After	Amber; Clear	Amber; Clear		

* Limits published in ASTM D3306 Standard Specification for Glycol Base Engine Coolant for Automobile and Light-Duty Service. These performance limits are also required for heavy-duty coolants and recycled coolants (ASTM D6471 or D6472). ASTM D1384 is only a test method.

A negative number indicates a net weight gain after correcting for the cleaning blank. (Refer to the published method for information on the calculations.)