



INHIBITOR, ENGINE HOT TEST FLUID

WSS-M97B56-A1

1.0 SCOPE

The material defined by this specification is an inhibitor concentrate containing corrosion inhibitors in an aqueous base at a ratio of around 30% inhibitors and 70% water in the as-received concentrate. The concentrated aqueous base inhibitor is used to make engine hot test fluid. Concentrated engine coolant can also be considered an inhibitor concentrate. Engine hot test fluids prepared by mixing the concentrated aqueous base inhibitor or concentrated engine coolant with water provide corrosion protection of all engine materials (iron, aluminum, copper and solder alloys).

2.0 APPLICATION

This specification is released for concentrated aqueous base inhibitor or engine coolant that when mixed with treated water shall provide corrosion protection and heat transfer for all engines during hot testing. After draining, the material will provide corrosion protection for up to three months in transport / storage and is fully compatible with initial fill engine coolant formulations.

2.1 LIMITATIONS

The aqueous base inhibitor mixed with water may not provide freeze protection. It should not be used for hot test and storage / transport when there is a possibility of freezing.

The engine coolant concentrate mixed with water will provide freeze protection. It should be used for hot test and storage / transport when there is a possibility of freezing.

3.0 REQUIREMENTS

3.1 STANDARD REQUIREMENTS FOR PRODUCTION MATERIALS

Material suppliers and part producers must conform to the Company's Standard Requirements For Production Materials (WSS-M99P1111-A).

Concentrated aqueous base inhibitor to be mixed with treated water, at 7.5% +/- 2.5% by volume and must be fully compatible with initial fill engine coolant formulations per WSS-M97B44-D/D2 and E1/E2.

Concentrated engine coolant to be mixed with treated water 50% by volume. The engine coolant must be an approved formulation meeting WSS-M97B44-D/D2 or E1/E2.

Treated water to meet WSS-M99P25-C.

After draining, the material will provide corrosion protection for up to three months in transport / storage (aqueous material at 10% by volume and coolant at 50% by volume).

In-vehicle, the hot test fluid mixed with water shall be stable so as not to change in form, quality or composition to adversely affect heat transfer or corrosion inhibition.

Date	Action	Revisions	Rev. 1
2013 06 04	Revised	See Summary of Revisions	A. Reaume, NA
2012 05 14	Activated		A. Reaume, NA



3.2 HOT TEST FLUID COMPOSITION

Hot test fluids supplied to this specification must adhere to the following:

- Minimum of 30% inhibitor package with the balance water per ASTM D1123 OR Engine coolant concentrate meeting WSS-M97B44-D/E1.
- ASTM D5827 *Standard Test Method for Analysis of Engine Coolant for Chloride and Other Anions by Ion Chromatography*
 - Silicon, from silicates, at 10 ppm maximum.
 - Phosphorous, from phosphates, at 10 ppm maximum.
 - Boron, from borates, at 5 ppm maximum.
 - Chlorides at 25 ppm maximum
 - Sulfates at 30 ppm maximum
 - Phosphates at 15 ppm max (measured by Ion Chromatography only)
 - Glycolate at 10 ppm max
 - Nitrite and nitrate at 5 ppm max
- ASTM D6130 *Standard Test Method for Determination of Silicon and Other Elements in Engine Coolant by Inductively Coupled Plasma-Atomic Emission Spectroscopy*
 - Aluminum at 5 ppm maximum
 - Calcium at 5 ppm maximum
 - Copper at 5 ppm maximum
 - Iron at 5 ppm maximum
 - Lead at 5 ppm maximum
 - Magnesium at 5 ppm maximum

3.3 LABORATORY MATERIAL TESTING

Requirements in sections 3.3.1 to 3.3.13 are screening tests to determine if hot test fluids qualify for more intensive evaluations. Unless noted, testing is to be performed on a 5% dilution of the concentrated aqueous base inhibitor with de-ionized water or 50% dilution of the engine coolant concentrate with de-ionized water.

3.3.1	Specific Gravity (ASTM D1122)	Report range
3.3.2	Water Content (ASTM D1123)	Report range
3.3.3	pH (ASTM D 1287)	Report range
3.3.4	Foaming Characteristics (ASTM D1881)	
	Foam Volume	Report
	Break Time	Report
3.3.5	Color (Visual)	Report