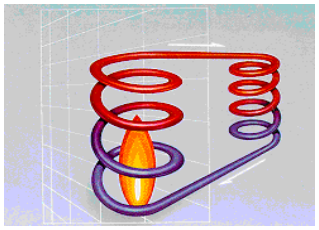

CALFLO *INFO*

DESCRIPTION OF THE OXIDATION (IP 48 TEST)

The oxidation test is run under conditions established in test method IP (Institute of Petroleum) 48. A measured amount of fluid is maintained at 204°C (400°F) for a set period of time. During this time, air or oxygen is bubbled through the fluid at a measured rate. This test has been selected by Petro-Canada because it is one of the most severe oxidation tests available and is determined to be representative, as a short term bench test, of conditions experienced by a heat transfer fluid in many applications.

At periodic intervals a portion of fluid is removed and tested as outlined below. The results of these tests for CALFLO AF and competitive products at various times are shown on the graphs on the opposite side of this sheet. All of these tests relate to the oxidation stability of the fluid. In each case, lower results are move desirable, as explained below:

1. **Viscosity Increase:** A fluid's ability to transfer heat is directly related to its viscosity. As the viscosity increases, the heat transfer efficiency decreases. Also, a higher viscosity or thicker fluid resulting from oxidation will restrict flow. For these reasons a fluid that can resist the effects of oxidation over a longer period of time is most preferred. A representative oil heat transfer fluid became too thick to flow by the end of the test. CALFLO AF exhibits the lowest viscosity increase.

2. **Total Acid Number (TAN):** As the oxidation of the fluid increases, more organic acids are formed. These acids are detected in the Total Acid Number test. As shown in the graphs, the TAN of CALFLO AF remains significantly lower than for the white oil heat transfer fluid.

3. **Solids:** The amount of solids (Carbon) formed is related to the amount of oxidation that occurs. Since Carbon is a poor conductor of heat, the more that is formed, the less efficient the heat transfer system will become. Also, high amounts of solids can restrict flow thereby reducing overall system effectiveness. CALFO AF exhibits the lowest solids formation because of its superior resistance.

The superior oxidation resistance demonstrated by this test is just apart of the reason that many manufacturers and OEM's are using and recommending CALFLO AF Heat Transfer Fluid from Petro-Canada in their heat transfer systems.

For more information on any Petro-Canada CALFLO Heat Transfer Fluids, please contact your nearest CALFLO representative or call Petro-Canada Fluids direct at 1-800-267-5968 or fax at 905-403-6875.

Oxidation Test Results - IP 48 at 400°F