

# MINI-ROTARY VISCOMETER

DE126346

## SIGNIFICANCE & USE

In this laboratory test, an engine oil is slowly cooled through a temperature range where wax crystallization is known to occur, followed by a relatively rapid cooling to the final test temperature, as determined by the SAE viscosity Grade of the oil. This test has predicted field failures due to lack of pumpability. These documented field failures have all consisted of oils tested at  $-25^{\circ}\text{C}$  and are believed to be the result of the oil forming a gel structure that results in excessive yield stress or viscosity of the engine oil, or both. (Excerpt taken from Page 30, ASTM Guide 44 Analysis of Petroleum Products and Lubricants edited by R.A. Kishore Nadkarni)

## TEST METHOD/SUMMARY

This test method covers the measurement of yield stress and viscosity of engine oil after cooling at controlled rates over a period exceeding 45 hours to a final test temperature between  $-10$  and  $-40^{\circ}\text{C}$ . The viscosity measurements are made at a shear stress of 525 Pa over a shear rate of  $0.4$  to  $15\text{ s}^{-1}$ . (Taken from ASTM D4684)

## TEST PARAMETERS

An engine oil sample is held at  $80^{\circ}\text{C}$  and then cooled at a program-med cooling rate to a final test temperature. A low torque is applied to the rotor shaft to measure the yield stress. A higher torque is then applied to determine the apparent viscosity of the sample. (Taken from ASTM D4684)

## APPARATUS/TEST FIXTURES

Mini rotary viscometer, an apparatus that consists of one or more viscometric cells in a temperature-controlled aluminum block, is used. Each cell contains a calibrated rotor-stator set. Rotation of the rotor is achieved by an applied load acting through a string wound around the rotor shaft. (Taken from ASTM D4684)

## REPORT

Test Temperature and Viscosity (cP) or Yield Stress, but not both.



DSC\_0141



DSC\_0130



DSC\_0133

