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Specifications of the Shear Stability Tester used in the Standardized Test Method of Lubricants Subjected to Mechanical Shearing

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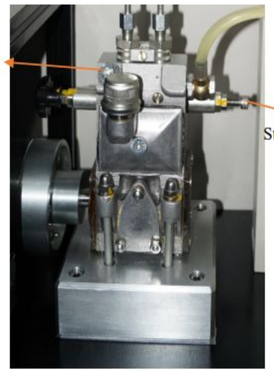
INTRODUCTION

Lubrication is critical in terms of shear stability. Majority of multigrade lubricants contain viscosity modifiers to raise the viscosity index (VI) and ensure that the lubricant can form a sufficiently thick coating to protect machinery from various forms of degradation. The majority of viscosity modifiers (VM) are composed of polymers that are vulnerable to shear thinning. Shear thinning can reduce the viscosity of a lubricant by an entire ISO grade, therefore putting moving parts at risk of deterioration. To guarantee the fluid's viscosity is stable, shear stability tests are conducted to evaluate the fluid's characteristics under shear stress and temperature changes.



SPECIFICATIONS

Models: K95701 / K95791

Electrical Requirements: 415V 60Hz 3Ph 1.5hp | 415V 50Hz 3Ph 1.5hp

Temperature Range: Ambient to 100°C

Oil Temperature Range: Ambient to 35°C

Flow Rate: 170 ± 5 ml/min

Injector Breaking Pressure: 140 bar

Pressure Gauge Range: 0 – 200 kg/sq. cm, Glycerol Filled

Dead Volume: 20 ± 5ml

Electric Motor: 1.1 Kw / 930 RPM

Diesel Injection Fuel Pump: Bosch PE 2A 90D

Nozzle Holder: KD 43 SA 53/15

Injector Nozzle: DN 8 S2

INSTRUMENT OPERATION

1. Once the instrument has been calibrated, follow the operational steps below.
2. Add 50 mL of test fluid to reservoir and free equipment of air by manually compressing the pump's flexible tube and withdrawing the venting screw.
3. Pump until reservoir is empty and line is full.
4. Drain oil from atomization chamber and turn top three-way cock so fluid flows to reservoir.
5. Add 30 mL + V_{run} (154 mL) = 184 mL
6. Open the venting screw and manually squeeze the pump's flexible tubing to release air.
7. Set the counter to three times n (30x930=2790) and start pump and allow oil to circulate until the counter shuts it down.
8. Drain extra oil to reach V_{run} (154 mL)
9. Counter set to 465
10. Close top three-way stock cock to store fluid in cooling jacket
11. Start pump, then deduct fluid reservoir volume from first reading.
12. At a difference of 2.5 mL of 77 Drain fluid reservoir and cooling jacket.
13. Oil in reservoir should be V_{run} + 30 ml
14. Turn the top three-way stock cocks to drain the reservoir.
15. Set counter to 27,900
16. Start pump with digital thermometer in reservoir.
17. Adjust water flow to maintain fluid temperature between 30 and 350 C for the first 10 minutes.
18. After 30 cycles, open the stop cock below the atomization chamber, drain 15 mL oil from 3-way cockCollect fluid in a clean container and remove thermometer.
19. Determine Kinematic viscosity at 1000C of sheared oil

K95791 SHEAR STABILITY TESTER

A Shear Strength tester is an instrument that measures an oil's capacity to preserve its viscosity after a number of shear cycles. After measuring the initial viscosity of the test oil, it is subjected to shearing at 30-cycle intervals. After 30, 90, and 120 cycles, viscosity is measured and compared to the starting viscosity of the oil. Oils with a lower drop in viscosity for the period of the test are considered to have greater shear stability than oils with a substantially higher drop in viscosity.

ASTM PUBLICATIONS

ASTM D6278

Performs an analysis of the shear stability of fluids that contain polymers. When polymer-containing fluids are investigated by a diesel injector apparatus method that makes use of European diesel injector test equipment, the test method measures the percentage of viscosity loss at a temperature of one hundred degrees Celsius. The decrease in viscosity can be attributed to the polymer degrading as a result of shear at the nozzle

ASTM D7109

Performs an analysis of the shear stability of fluids that contain polymers. The viscosity loss of polymer-containing fluids at 100 degrees Celsius is evaluated by a diesel injector apparatus procedure that makes use of European diesel injector testing equipment, and the test method measures the loss of viscosity in mm2/s and in percent at that temperature. The decrease in viscosity can be attributed to the polymer degrading as a result of shear at the nozzle. After 30 and 90 cycles of shearing, the loss in viscosity of the material is measured and analyzed.

CONCLUSION

When evaluating viscosity of oils and fluids under mechanical shearing, the K95791 Shear Stability Tester produces highly consistent outcomes. This instrument has specifications that meet the requirements to conform to both ASTM D7109 and ASTM D6278 standard testing methods. Based on the results from each test, oils that experience a smaller viscosity reduction during the course of the test are considered to have greater shear stability compared to oils with a relatively significant decline.

REFERENCES

Products - Shear Stability Tester. Koehler Instrument Company, Inc. (2019, August 14). Retrieved April 19, 2022, from https://koehlerinstrument.com/products/shear-stability-tester/