Determination of the Flow Pressure Measurement of Semi-solid Materials in Low Temperature Environments

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Overview

Currently, a few experimental techniques, such as the US Steel Grease Mobility, the Lincoln Ventmeter and the Apparent Viscosity of Lubricating Greases (ASTM D1092) Methods are used to study the low temperature properties of greases. The Kesternich Method (DIN 51805) has been used in Europe to gain a better understanding of low temperature properties of greases.

What is the Kesternich Method?

The Kesternich Method (DIN 51805) is a test method that tests the flow of greases at low temperatures. To perform the Kesternich test, the test nozzle is filled with the grease sample, typically by repeatedly pressing the nozzle against the sample until it is sufficiently packed. After the device has been cooled to the selected temperature, pressure is applied to the grease sample, increasing in 30 second intervals until the grease sample has been forced out of the nozzle.

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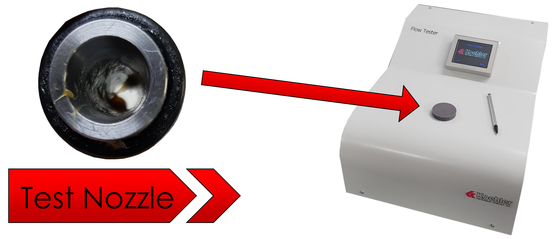
Preparation for Testing

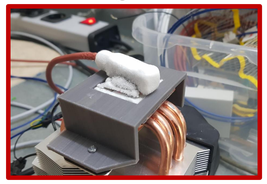
Grease is loaded into the nozzle by using a spatula to pack it inside. The nozzle is then inserted into the instrument and cooled before the test begins.



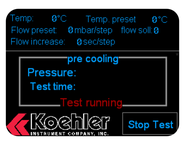
How Our Instrument Works

The K95300 is a fully automatic test system that can achieve temperatures of -50°C without external cooling devices. The Kesternich Test Method is currently programmed into the instrument and allows standard or custom configurations.

Cooling Unit



The instrument will cool down the test nozzle to the desired test temperature using a cascaded Peltier system. 1

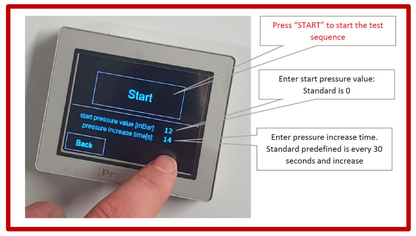


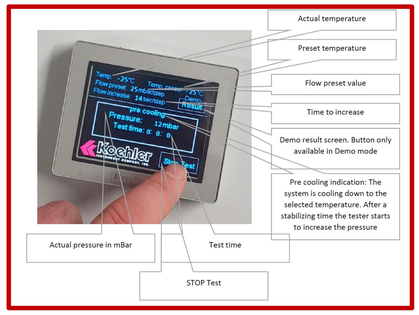
After the test temperature is reached, the system will start the stabilization time, ranging from 15 to 500 minutes. 2

Once the test begins, the instrument will increase the pressure on the grease in the test nozzle in intervals for the test. 3

If the system recognizes a rapid pressure decrease, the system will store the maximum pressure value as the test result. 4

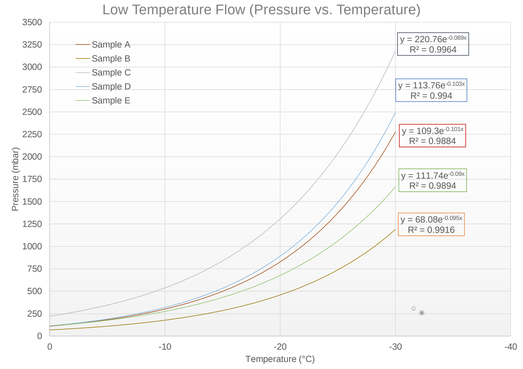
Data Screens





Data Analysis

The flow pressure measurements of five grease samples were collected at 0°C, -10°C, -20°C, and -30°C with 25mbar steps and 30 second increase times. The results show a similar exponential increase of flow pressure between the five samples as temperature decreases with high R-square values indicating a distinct correlation with the trend lines.



Conclusion

The K95300 shows highly repeatable results and is well within the requirements outlined by the Kesternich Method. The instrument also features newer technology than competitive instruments available, such as lower cooling temperatures and more configuration options, making the K95300 a suitable choice for low temperature mobility testing.