# Standardized Assessment of Flow Properties of Lubricating Greases at Below Ambient Temperatures & Development of a New Grease Flow Tester

Gavin Thomas, Stanley Zhang, Dr. Raj Shah

## Introduction

Most of the commercial greases today are optimized for ambient temperatures and would become more viscous in low temperatures, causing a decreased lubricating effect of the grease throughout a vessel and leading to reduced efficiency and performance. Commercial lubricant greases optimized for low temperatures are rare due to the lack of instruments able to properly test lubricants according to the Kesternich Method (DIN51805) to ensure validity of experimental results.

## What is the Kesternich Method?

The Kesternich Method (DIN51805) is a test method that assesses the flow properties of lubricating greases at various low temperatures. To perform the Kesternich test, the test nozzle is filled and packed with the grease sample. The device is then cooled to the desired testing temperature and increasing pressure is applied to the grease sample in 30 second intervals until the grease sample has been forced out of the nozzle. The pressure at which the lubricating grease leaves the nozzle is denoted as the flow pressure and listed in mbar.

It is with according to this this method in which our K95300 is developed and based on as to give a standardized frame of reference for low temperature flow pressure. Not only does it ensure validity, but the K95300's automation and durability allows for a more economic, efficient, and precise process for performing these tests at extreme negative temperatures when compared to other instruments that lack a proper external cooling device. In addition, the K95300 has an intuitive interface and results can be readily displayed, saved, and exported, as necessary.

Koehler INSTRUMENT COMPANY, INC.

## How Our Instrument Works

The Low Temperature Grease Flow Tester (K95300) has been developed with DIN51805 in mind and provides a safe and reliable way to measure the flow properties of various lubricating greases in extreme cold temperatures. The K95300 is a fully automated instrument that can determine the flow pressure of grease at temperatures as low as -50°C without an external cooling device.

1. Load grease on to a spatula and pack it inside the test sleeve. Then, insert test nozzle into the instrument.

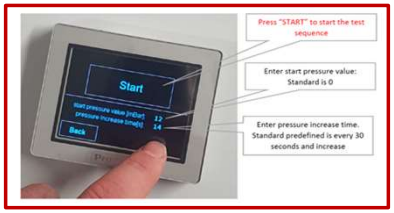

2. The instrument will cool down the test nozzle to the desired test temperature using an internal cascaded Peltier system.

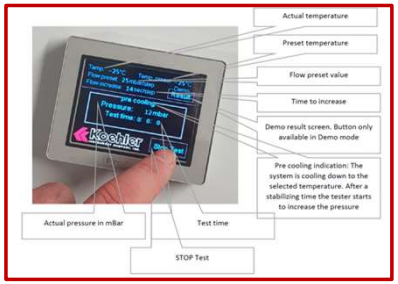
3. After the test temperature is reached, the system will start the stabilization time, ranging from 15 to 500 minutes.


4. Once the test begins, the instrument will begin applying pressure on the grease in the test nozzle in incremental steps of 30 seconds.


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

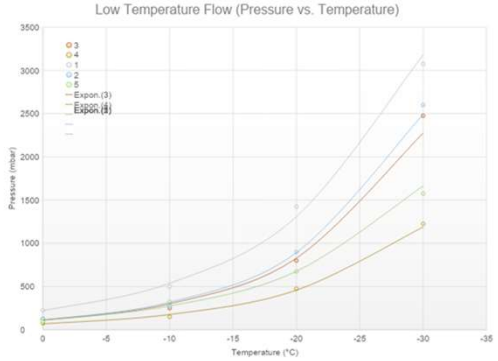

## Data Screens




## Data Analysis

In a sample experiment, the flow pressure of five samples of greases were measured with the K95300 at 0°C, -10°C, -20°C, and -30°C. The resulting pressure versus temperature graph displays a similar exponential trendline for each sample, indicating an accuracy and reliability within the testing procedure assuming each grease would go through similar flow patterns, only at different pressures, in repeated trials.




The K95300 exhibits a high level of reliability and accuracy, all in accordance with the standardized Kesternich Method. With the K95300 being able to report a high quality of results in a very efficient manner, it would be justified to conclude that this instrument is one of the best choices available for determining the lubricating greases that are most suitable for low temperature operating conditions and applications.