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Research Report: D02-1780

Interlaboratory Study to Determine Suitability of ASTM D445-14 Manual Method for Use with Diesel Fuels, Biodiesel Fuels and Biodiesel Fuel Blends

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1. Summary

The precision of 40C kinematic viscosity measured using the manual method in D445-11a for a dataset of kerosene, diesel fuels, biodiesel fuels and biodiesel fuel blends was determined. The determinability, repeatability and reproducibility are **0.37%, 0.56% and 2.24%,** respectively. The degrees of freedom for repeatability and reproducibility are 16 and 19, respectively, which means that the calculation of precision is valid but a caveat needs to be added to the precision statement as stated in section 8.4.4 of ASTM D6300. Therefore, biodiesel fuels and biodiesel fuel blends can be added to D445-11a with the addition of a precision statement for these samples.

2. Objective

There is a critical industry need to address the precision of D445-11a when testing biodiesel fuels and biodiesel fuel blends. There is data from the Grand Design ILS to determine the precision for biodiesel fuels and biodiesel fuel blends. Therefore, the objective of this research report is to describe the precision of the 40C viscosity data measured for biodiesel fuels and biodiesel fuel blends using the manual method described in D445-11a.

3. Test Method

The test method D445-11a was the method of reference. It was stated to the Participants that manual instruments should be calibrated using either a reference viscometer or by using ISO 17025 certified viscosity reference standards. It was recommended by the Grand Design Task Group prior to the commencement of the Grand Design ILS that manual kinematic viscometers as specified in ASTM D446 be used and that at least two successive determined values be measured. Flow times should meet the minimum stated in ASTM D446 (i.e. 200s or higher). Temperature control should be the same as listed now i.e. +/- 0.02°C in the manual section.

4. Test Samples

The fuel samples used in the Grand Design are listed below. These samples included diesel fuels, biodiesel fuels and biodiesel fuel blends samples and each sample was provided in a single drum from the suppliers. They were shaken prior to distribution and at regular intervals as they were dispensed into the sample bottles. These fluids were blind coded and subdivided to send to laboratories participating in the ILS. The samples for the Grand Design ILS were prepared and shipped by DCG partnership, who is an ISO/EC 17025 accredited company. The samples were homogeneous when they were subdivided. One laboratory reported that samples they received were not homogeneous. In performing the statistical analysis of the data several samples were identified as outliers therefore it appears that these inhomogeneous samples were handled during the analysis. The data for all fuels were combined in the analyses shown in this research report in order to have sufficient degrees of freedom to perform statistical analyses.