

Establishing an experimental pre-conditioning procedure for rheological characterization of oil based drilling fluids

D. Assembayev¹, V. Myrseth², et al.

¹Norwegian University of Science and Technology, Trondheim, Norway

²SINTEF Petroleum Research, Department of Drilling and Well, Bergen, Norway

Oil based drilling fluids are thixotropic fluids, meaning that their properties are time –and stress dependent. It is also known that the fluid properties of oil based drilling fluids are highly dependent on shear history. Shear thickening behavior may be observed during continuous shear at lower rates. As a result of this, it is important to have a consistent procedure for how to treat the fluids prior to a measurement. This is vital in order to be able to compare experimentally determined flow properties and to enable comparison of results between different laboratories.

In the oil industry, the ISO 10416/ISO 10414-2 standards are used for determination of viscosity and gel strength of drilling fluids by use of direct-indicating viscometers (Fann viscometers). However, these standards do not specify in detail how the fluids should be pre-conditioned before measurements. Further, to enable comparison of results from Fann viscometers to measurements done with a rheometer, it is even more important to have consistent pre-conditioning of the fluids.

In the present research the effects of pre-shearing and resting time on rheological measurements is studied systematically. Resting time is varied from 0 to 24 hours, and all measurements are performed with no pre-shearing and with 10 min pre-shearing. For all combinations of resting time and pre-shear, rheological measurements are

performed with both a Fann Model 35 viscometer and with an Anton Paar rheometer. Based on these results we suggest a pre-conditioning standard for oil based drilling fluids before rheological characterization. Such a method will ensure higher measurement precision and allow more robust comparability of rheological measurements.