ConTec

Test Report

Three different ConTec Viscometers tested with CylEsso-1000 oil

Information

To estimate the accuracy, the ConTec/ BML viscometers with a wide range of radius of inner and outer cylinders (as well as the height of the inner cylinder) were tested with commercial oil, CylEsso 1000.

The measured viscosity was in the range 2.9 to 3.4 Pa·s depending on temperature of the oil tested. This is considered acceptable as the oil industry laboratory, Fjolver, extrapolated the viscosity to 3.5 Pa·s at 23°C.

When the effective height of the inner cylinder was 84 mm or larger, yield values in the range of -2 to -4 Pa were registered. As one is normally measuring yield value that is about ten to thousand times higher than the 3 Pa, this is also considered acceptable.

On the whole, the accuracy of the three instruments tested (with various dimensions of the cylinders) was excellent, relative to the materials normally tested, namely cement paste, mortar and concrete.

Recently, several tests were run on three types of ConTec viscometers, namely the ConTec BML-WO2, ConTec BML-WO3 and ConTec 4U series. A four-point down curve with rotational velocities ranging from 0.85-0.1 rounds per second was used. The tests were run in order to compare the results of the three different types as well as to compare the results to a different measurement. The fluid used in the measurement was oil, more specifically CylEsso-1000 which has also been used in previous tests. The viscosity of this oil has also been measured with a tube viscometer at 80°C and 60°C at Fjölver Labs Inc. If the relationship between temperature and viscosity is assumed perfectly logarithmic the viscosity at 23°C can be extrapolated to yield $\mu \approx 3{,}5$ Pa· s.

The results of the measurements using the ConTec/-BML Viscometers are shown in the right hand column.

As these tables show, all the models presented, within a reasonable margin, give the same results for the viscosity, μ. They are all slightly lower than the one obtained at Fjolver but considering that it is an extrapolated experimental value the similarities are quite good

The negative yield values however appear strange at first glance. However, when taking a closer look one can see that these values range only from **0,03**-0,4% of the overall capacity and this slight zero-error is therefore negligible for most practical purposes. This error might be due to a small frictional factor in the inner cylinder bearing. The fact that smaller test areas result in larger negative yield values support this idea because then the friction factor is a larger portion of the overall load measured. This means in essence that when measuring more viscous materials the error will disappear.

From the above it can be concluded that the ConTec viscometers produce repeatable and mutually compatible results for fluids of low viscosity. This is a noteworthy result considering that the apparent viscosity of the oil is only a fraction of what the machines were designed to measure.

BML-WO2

h = **118**mm r_i = 84mm r_o = 100mm

Test #	Yield value τ_o (Pa)	Viscosity μ (Pa·s)	Temperature T (°C)
1	-4	3,0	23,1
2	-3	3,0	23,2
3	-4	3,1	23,2
4	-3	3,2	22,7
5	-4	3,2	22,6

BML-WO3

h = **149**mm r_i = **100**mm r_o = 115mm

Test #	Yield value τ_o (Pa)	Viscosity μ (Pa·s)	Temperature T (°C)
1	-3	3,0	23,1
2	-3	3,0	23,2
3	-3	3,0	23,0
4	-3	2,9	23,0
5	-3	2,9	23,1

Viscometer-4U

h = **42**mm r_i = **84**mm r_o = **100**mm

Test #	Yield value τ_o (Pa)	Viscosity μ (Pa·s)	Temperature T (°C)
1	-8	3,3	22,1
2	-7	3,3	22,0
3	-8	3,3	22,0

h = **119**mm r_i = **84**mm r_o = **100**mm

Test #	Yield value τ_o (Pa)	Viscosity μ (Pa·s)	Temperature T (°C)
1	-2	3,4	21,9
2	-3	3,4	22,0
3	-2	3,3	22,0

h = **42**mm r_i = **84**mm r_o = **92**mm

Test #	Yield value τ_o (Pa)	Viscosity μ (Pa·s)	Temperature T (°C)
1	-10	3,1	22,1
2	-8	3,2	22,1
3	-11	3,1	22,4

h = **119**mm r_i = **84**mm r_o = **92**mm

Test #	Yield value τ_o (Pa)	Viscosity μ (Pa·s)	Temperature T (°C)
1	-3	2,9	22,6
2	-4	2,9	22,8
3	-2	2,9	22,8

Tómas Þorsteinsson, BSE

ConTec
Steyputækni ehf.

Laugarásvegur 7
104 Reykjavík
Iceland

Tel: +354 896 9674
Fax: +354 588 2880
E-mail: info@contec.is