

VISCOSITY EFFECT ON TURBINE FLOWMETERS: AN OVERVIEW

Turbine flowmeters exhibit a performance which is dependent upon the viscosity of the measured fluid to some degree.

In general, it has been observed that there exists a viscosity threshold effect where, for any viscosity below this threshold viscosity effect, the meters performance is essentially independent of viscosity. This threshold viscosity varies with flowmeter size. Larger flowmeters have a higher viscosity threshold than do smaller flowmeters.

For a given flowmeter size and specified flow range, it is observed that as the viscosity increases the low portion of the flowmeter's range is more effected than the higher portion of the flowmeter's range. For a required accuracy of measurement this results in a minimum linear flow rate increasing as the viscosity increases. There also is a slight change in the average calibration constant as the viscosity increases. Figure 1 shows the calibration trends typical of a turbine flowmeter.

Due to the cost advantage of using a turbine flowmeter over a competing flowmetering type, turbine flowmeters are often used at viscosities that introduce some loss in accuracy and some loss in flow range. For these applications the flowmeter is often calibrated on a test fluid that approximates the viscosity(s) it will see in service.

In selecting a flowmeter for operation in a viscous fluid, it is generally preferable to size the flowmeter so it will be operated in the higher portion of its range to minimize viscosity effects in the measurement.

It is also important to obtain a realistic estimate of the accuracy which may be achieved. Often a flowmeter may be considered as a candidate for an application even if its accuracy is only +/-1% of full scale instead of the standard +/-0.5% of reading which may be achieved on low viscosity fluids.

Figure 1 has plotted on it the allowable error band of +/-1% of F.S. to be used as a frame of reference.

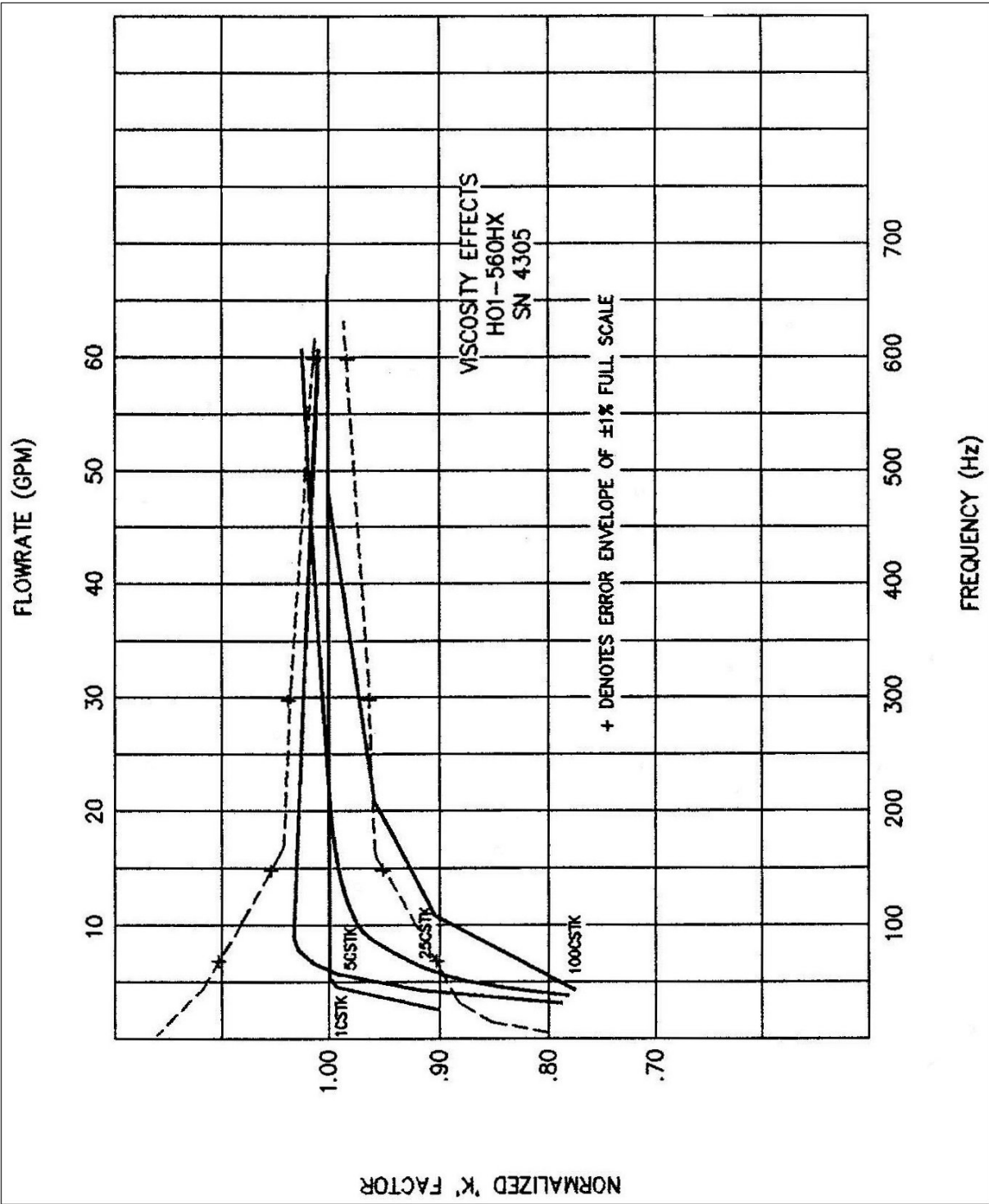


Figure 1