

Technical Information:

ProMinent Fluid Controls Ltd.



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Subject: Viscosity
Product: Fluids

What is Viscosity?

Viscosity is a measure of the resistance of a fluid to deformation under shear stress. Viscosity describes a fluid's internal resistance to flow and may be thought of as a measure of fluid friction. Water, having a low resistance to flow would have a low viscosity, while vegetable oil is thicker with a high resistance to flow, it would have a high viscosity.

Viscosity is more easily understood if we look at Laminar Flow. Laminar flow is the rate at which a gas or a liquid is flowing over a surface. The molecules next to the surface have zero speed, as they are attached to the stationary surface. The farther the molecules are away from the surface, the faster they will travel. This difference in speed is caused by the friction in the gas or fluid. The molecules have a bond to each other and the strength of this bond, or how well the molecules can cling to each other, is the Viscosity of the substance. Viscosity determines the amount of friction, which in turn determines the amount of energy absorbed by the flow.

Viscosity can be measured using several different methods, one of the simplest to both visualize and demonstrate would be to have a calibration column and fill it with water, and another filled with oil. Dropping a ball bearing in to the water, you will see the ball bearing sink to the bottom very rapidly. Doing the same to the oil, you will see the ball bearing descend to the bottom at a much slower speed. In this we can see that the oil is more viscous as there is more of a bond between the oil molecules causing more friction between the ball and the oil producing a slower descent.

Viscosity is most commonly measured in cP. To get an idea of some liquids and their viscosities, the viscosity of water at 20 deg. C is 1.002 cP, Olive oil is 84 cP and Castor oil is 896 cP