

Handling Viscous Fluids With Thermo Scientific FH Series Pumps

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Key Words

- Peristaltic Pumps
- Tubing Pumps
- Viscous Fluids
- Shear Rate
- Norprene
- PharMed
- Tygon
- Viton
- Gore

Thermo Scientific peristaltic pumps are ideal for pumping viscous products due, in part, to their ability to sustain volumetric accuracy regardless of viscosity to ensure consistent fluid handling.

To best pump viscous fluids, it's important to understand viscous fluid behavior at different shear rates. There are a number of types of viscous fluid behavior.

Newtonian fluids

Viscosity is constant with change in shear rate or agitation. Forces to cause motion increase proportionately as speed increases. Fluids showing Newtonian behavior include water, mineral oils, syrup, hydrocarbons, and resins.

Thixotropic fluids

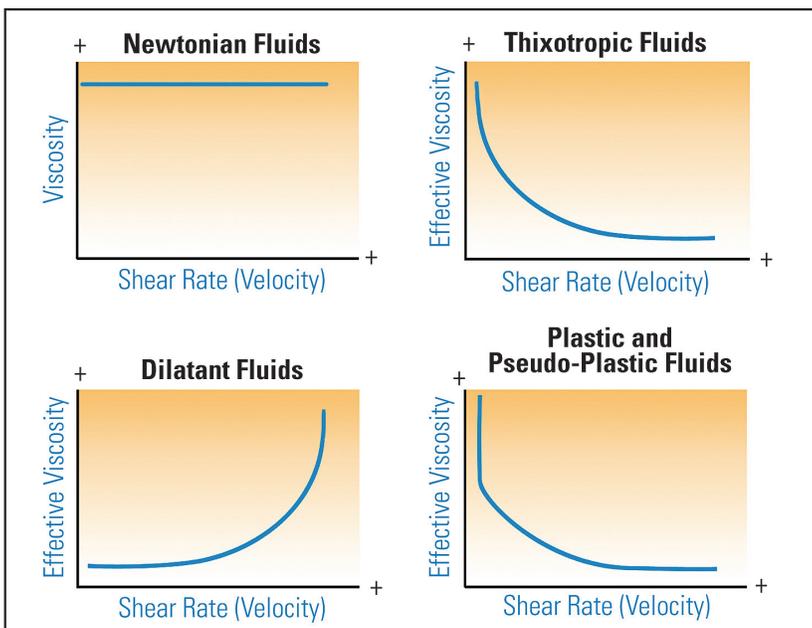
Viscosity decreases as shear rate or agitation increases. The forces to cause motion are relatively lower as speed increases. Examples are soaps, tars, vegetable oils, shortening, glue, inks, peanut butter, and some slurries.

Dilatant fluids

Viscosity increases as shear rate increases. Forces to cause motion may greatly increase as speed increases. Some liquids showing dilatant behavior are slurries, clay, and candy compounds.

Plastic and pseudoplastic fluids

Viscosity decreases as shear rate increases, but initial viscosity may not be great enough to prevent start of flow in a typical pumping system. Typical plastic fluids are gels, latex paints, lotions, shortening and ketchup.



To best pump viscous fluids, it's important to understand viscous fluid behavior at different shear rates. There are a number of types of viscous fluid behavior.

To maximize the pumping efficiency of viscous fluid, follow these steps:

Slow down the speed of your pump.

Increasing the speed beyond a certain point will not have any effect on flow rate. The maximum efficient speed of the pump decreases as viscosity increases and tubing size decreases.

Choose a larger size tubing.

Choose a larger size tubing than required to pump water. The table on the back of this Application Note will help you choose the best size.

Choose the right tubing

Choose a firm tubing such as Norprene®, PharMed® BPT, Viton®, or Tygon® LFL, or any of the Gore® High Resilience (HRT) materials. Performance will be better because the tubing returns to its original shape quickly

after pump head occlusion. Choose high-performance tubing — the thicker wall returns more quickly to its original shape than precision tubing. The quicker return allows liquid to be pulled into the tubing with greater force.

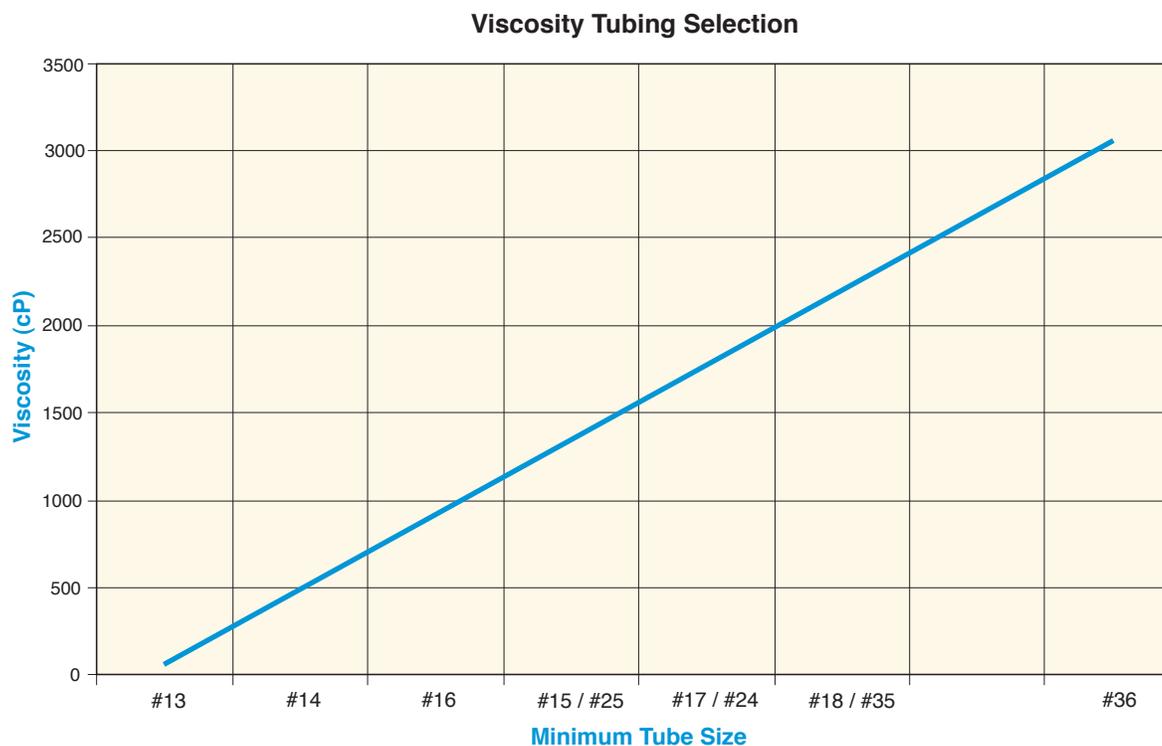
Select smooth bore tubing

Selecting a tubing with a smooth bore will decrease frictional forces. Tygon LFL, silicone, BioPharm or any of the Gore High Resilience (HRT) materials are good choices.

Decrease the viscosity of your fluid.

Heat your fluid if possible; viscosity usually decreases with temperature.

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