American Polywater's

TechnicalTalk

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A "Pour" Explanation

American Polywater manufactures both "liquid" and "gel" type pulling lubricants. Which type is better? Why do we make both types? When should each type be used? This "Technical Talk" will present American Polywater's research on pulling lubricant viscosity and application.

Liquid versus Gel

We must first develop a common understanding of "liquid" and "gel." For this discussion, a liquid lubricant is one that will pour through a one-inch spout. If it's too thick to pour, it's not a "liquid."

This thickness property of a liquid can be measured with a viscometer. Our definition of a liquid essentially includes materials with viscosities from 1 to 20,000 centipoise (cps). For example, water has a viscosity of 1 cps, while honey has a viscosity of 50,000 cps. Most commercially available "liquid" pulling lubricants are "thicker" liquids with viscosities from 1,000 to 15,000 centipoise.

Semi-liquid lubricants can be poured or gravity fed into an applicator.

Liquid Lubricants:

- Popular for underground work, where the lubricant can be poured into a vertical flexible conduit, a stub-up, or a feeder tube (elephant trunk).
- Often have stringy character to pull the lubricant through the bends to all parts of the duct.
- Useful for long pulls of lightweight fiber optic cable where continuous "breaking" of high viscosity gels can increase tension.
- Perfect for gravity feed lubrication methods such as the LubeMaster™ Applicator, which attaches right over the fiber optic cable.

Gel Lubricants:

- Preferred in overhead application where dripping is minimized.
- Used in manual applications where lubricant must be scooped and applied by hand.
- Used in Polywater Front End Packs™, where gel character allows the lubricant to slowly ooze as the pack is pulled in front of the cable.
- Enable greater quantities to be applied to the cable for longer pulls
- May be pumped with appropriately designed pumps.

Gel Lubricants can be hand applied and will cling to the cable for overhead applications.

Lubricant Application Using Pumps

One difference between a liquid and gel is in application method. However, both liquid and gel lubricants can be pumped with the proper equipment (into vertical conduits, down into feeder tubes, etc.). As expected, the liquid version is freer flowing and requires less work to pump.

Feature Pump, Polywater's LP-D5

The LP-D5 is a drill-operated, self-priming, flexible impeller transfer pump. It sets directly onto a pail or drum and will pump all Polywater® Lubricants to the conduit or onto the cable during pulling. A 10-foot discharge hose is included. The hose must be shortened for the viscous Dyna-Blue® and Polywater® G Lubricants to minimize back pressure.

Application Video Available
Click here for more info

Pumping Rates through the LP-D5

Polywater® Lubricant	Viscosity	Drill Speed	
		1000 rpm	1750 rpm
F	3,000 cps	1 gpm	2 gpm
PJ	17,000 cps	1 gpm	2 gpm
NB Silicone	20,000 cps	1 gpm	2 gpm
J	37,000 cps	0.7 gpm	1.5 gpm
Dyna-Blue	80,000 cps	0.1 gpm	0.3 gpm
G	80,000 cps	0.1 gpm	0.3 gpm

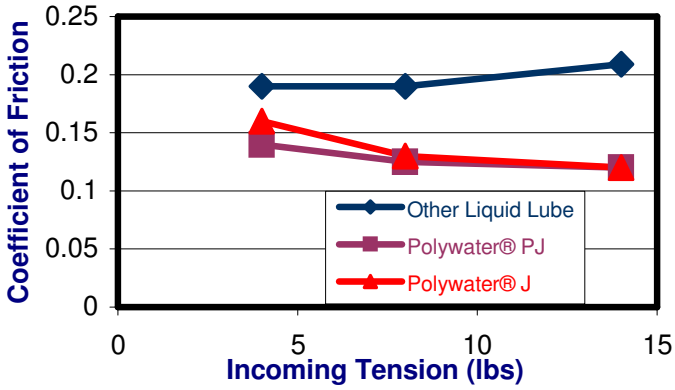
See American Polywater Pump History for more detailed information on our lubricant pump research.

Slipperiness/Friction Reduction

Not all liquid and gel lubes are the same. It is still important to specify a lubricant based on all the performance characteristics. The most critical function of a lubricant is pulling tension reduction as measured by the coefficient of friction. Other factors that make a lubricant a more effective friction reducer are the wetting and coating character as well as the resistance to shear. Cable manufacturer approvals and cable compatibility are a requirement and should be documented. Safety considerations include fire performance and combustibility properties as well as toxicity.

Friction reduction effectiveness can be independent of viscosity in a well-formulated lubricant. For instance, our research shows little difference in friction performance between POLYWATER® J and POLYWATER® PJ (pourable J). These lubricants are very similar chemically; with the only property difference being their viscosity (PJ averages 15,000 cps. - J averages 35,000 cps.).

The adjacent graph shows friction coefficient of Polywater J and PJ plotted against incoming (back) tension in a *multi-bend* pull. Note that while these lubricants show similar performance, another liquid lubricant tested is not nearly as effective. So lubricants should still be chosen based on total performance, not just application viscosity.*



*For more information on this friction measurement method, call 1-800-328-9384 and ask for our paper; "A New Cable Pulling Friction Measurement and Results.

The research shows that differences in friction coefficient do not depend on the physical state of the lubricant (liquid versus gel). The friction properties of a lubricant depend primarily on its ingredients and chemistry; that is, how it is compounded. Many other important lubricant characteristics not covered here, such as cable compatibility, are also independent of viscosity.

Summary

The difference between a liquid and a gel lubricant is one of application convenience. Both have their unique applications properties, and in a most cases, either type is perfectly satisfactory.

If you are interested in comparing pulling lubricant application methods in the field, or in seeing detailed lubricant specs, please contact American Polywater's Sales Department at 1-800-328-9384. Lubricant specs are available on disk as well as hard copy.

Comments, questions, or editorial requests, please contact:

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