



Volume 1

FIBER OPTIC INSTALLATION

How Much Lubricant is Enough?

Ask a field crew how much pulling lubricant they use on a fiber optic pull. Ask another, then another You'd be surprised at the wide range of answers you'd receive.

Is there a *right amount* of lubricant, an amount that does the job, but doesn't waste lubricant by using excess? What is the *right amount*?

Let's Engineer It.

One way to determine the amount of lubricant needed for a pull (in gallons or quarts) is to calculate it theoretically.

For instance, we know that a 10-mil (0.010 inch) film of POLYWATER® F does a more than adequate job of minimizing cable tension. A 10-mil film looks like a thick coating of wet paint; you can easily see it and feel it.

Whether we cover the interior wall of the conduit or the exterior wall of the cable with a 10-mil film of lubricant. That should be enough – the *right amount*.

We can calculate the volume of lubricant it takes to produce such a 10-mil film. The results depend on both the length of the run and the conduit ID (or cable OD). Typical calculation results are presented in the following table.

Conduit ID or Cable OD	Gallons of POLYWATER® F Needed for Continuous 10-mil Coating on a 1,000-foot Length Pull
0.5"	0.8 Gallons
1.0"	1.6 Gallons
1.25"	2.0 Gallons
1.5"	2.4 Gallons
2.0"	3.3 Gallons

Get Real!

Actually, these calculations are reasonably valid. They are in the right ballpark. American Polywater gets involved in a wide variety of fiber optic work; and when there is enough information to track typical lubricant usage, it is between 5 and 10 gallons of POLYWATER® F per mile of cable pulled, or 0.9 to 1.9 gallons per 1,000 feet. Since the "typical pull" is into 1 to 1.5" ID conduit with a 0.3" to 0.6" OD cable, we see actual use is in the theoretical range calculated in the table above.

More or Less?

There are a *several factors* that may increase the *appropriate amount* of POLYWATER® F from that calculated above. The most common factor is conduit type.

For instance, we recommend a higher quantity of lubricant in corrugated duct. This is not because of the greater surface area. In corrugated conduit, it's harder to keep lube in the area where the cable actually rubs; i.e., on *top* of the corrugations. In fact, the corrugations tend to wipe the lubricant off the cable. So, . . . we compensate for this by using more lubricant.

This does not mean that corrugated conduit is more difficult to pull into or that it causes higher tension. In fact, the opposite seems to be true, but that is a subject for a future *TeleTopics*.

Other factors that influence the quantity of lubricant include the number of bends in the conduit system, the interior condition of the conduit, and cable fill percent.

Where the Lubricant is Needed.

Once we have the *right amount* of lubricant, the challenge in fiber optic installation is to get it to all the points where the cable rubs - including those places 5,000 or more feet into the duct.

A good lubricant like POLYWATER® F helps here. By fully wetting on the cable jacket (and not dripping off over time), POLYWATER® F stays with the cable for long hauls.

A number of ingenious methods have been used to get lubricant to where it's needed to reduce friction. Our recommendation is to put lubricant into the conduit and then push and spread it with the LONGSHOT™ Spreader as the cable is pulled.

We've also seen:

- Lubrication down the line as the cable arrives using special T's or other points of conduit access.
- Pumping (Try American Polywater's Models LP-3 or LP-5 Pumps for this.) and/or blowing lubricant through the duct.
- Using our LongShot™ Spreader or a similar device as a piston to pull lube into the conduit with suction.

The most common reason for needing lubricant quantities about the theoretical guidelines is the need to get the lubricant everywhere. Sometimes an excess of lube is the only practical way to do this, and it's much less expensive than alternatives like shorter pulls.

Keep It Simple

A neat way to lubricate fiber optic cable is our LubeMaster™ Applicator. The cable runs through a reservoir of POLYWATER® F, then through a compressed sponge that meters on a lubricant film.

The metering sponge in the applicator is set for the viscosity and pitivity of POLYWATER® F. The LubeMaster™ device doesn't work well with other lubes.

Use gravity feed to automatically apply the *right amount* of POLYWATER® F . . . the LubeMaster™ Applicator keeps it simple.

Formula for Success

American Polywater developed the first guideline for estimating lubricant quantities required for fiber optic pulling. The equation

$$0.0015 \times D \times L = \text{Quantity in Gallons}$$

Where:

D = Diameter of Conduit in Inches
L = Length in Feet

provides lubricant quantity estimates similar to those discussed in this article.

Technical literature is available covering these subjects and can be obtained by writing or calling American Polywater.

Comments, Questions, or Requests:

"Teletopics" Editor

American
Polywater
Corporation

P.O. Box 53
Stillwater, MN
55082
USA

Phone: 1-(651)-430-2270
www.polywater.com

Fax: 1-(651)-430-3634
tteditor@polywater.com