Polywater®
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TECHNICAL DATA SHEET
POLYWATER® LZ PERFORMANCE LUBRICANT

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DESCRIPTION

Polywater® LZ Lubricant is a high-performance, cable pulling lubricant. Polywater LZ is compatible with a broad variety of LSZH/LSHF compounds. Polywater LZ is also compatible with other high-performance cable jackets. It provides excellent tension reduction and is recommended for all types of cable pulling.

Polywater LZ is slow drying and leaves a thin, slippery film that retains its lubricity for months after use. Polywater LZ does not sustain flame when used with fire-retardant cables and systems. Its dried residue is nonconductive and noncombustible.

Polywater LZ is a stringy gel. It can be applied by hand or using Polywater's LP-D5 Pump. It is also available in the unique Front End Pack™ prelubrication bags.

FRICTION TESTING

Lubricity: Polywater LZ shows superior friction reduction on a variety of jacket types. Typical friction coefficients at 200 lbs/ft (2.91 kN/m) normal pressure are shown. Test results are based on the method described in the white paper, "Coefficient of Friction Measurement on Polywater's Friction Table, 2019". Values are averages based on cable jacket and conduit materials from multiple manufacturers.

CABLE JACKET	CONDUIT TYPE				
	STEEL	FRP	HDPE	PVC	EMT
LSZH	.16	.17	.07	.08	.21
CSPE	.21	.24	.12	.16	.24
CPE	.15	.19	.09	.10	.17
XLPE	.13	.12	.06	.06	.12
LLDPE	.10	.11	.05	.06	.13

Coefficient of friction data on additional or specific cable jackets or conduits can be obtained from American Polywater Corporation.

Polywater LZ is a specification grade lubricant

PRODUCT FEATURES

- **Low Friction Coefficient**: Maximum tension reduction on all types of cable jackets.
- **Universal**: Suitable for all types of jackets and cable, including power, control, and instrumentation cable.
- **Low-Smoke Zero Halogen (LSZH/LSHF) Compatible:** Extensively tested on LSZH/LSHF thermoplastic and thermoset jackets.

END USE

Polywater LZ is a specification grade lubricant that meets the performance requirements of:

- Nuclear and other generation plants
- Mass transit systems and airports
- Oil and petrochemical

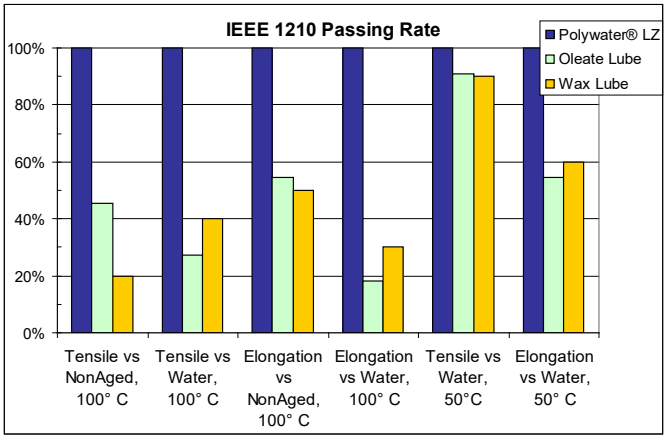
OFFICIAL APPROVALS

UL Listed
UL Listed to Canadian safety standards

CABLE COMPATIBILITY

Tensile and Elongation:
LSZH, CSPE, LLDPE, XLPE, CPE, and PVC cable jacket materials aged in Polywater Lubricant LZ per IEEE Standard 1210[1] meet the tensile and elongation retention requirements of that standard.

Modern LSZH jackets are numerous and vary significantly in formulation. Polywater LZ shows broad compatibility with this jacket technology. As shown in the graph below, the common cable pulling lubricants available through local supply houses show significant and sometimes devastating effects on LSZH cable jackets.



Polyethylene Stress Cracking:
Polywater LZ shows no stress cracking on LDPE, MDPE, or HDPE cable jackets when tested per IEEE Standard 1210.[1]

Volume Resistivity:
There are no significant changes in the conductive properties of XLPE and EPR semi-conducting compounds when volume resistivity is tested according to IEEE Standard 1210.[1]

Building Wire Testing:
THHN and XLPE building wire meet UL tensile, elongation, and voltage withstand requirements after exposure to Polywater LZ as tested by UL requirements.[2]

Cable Approvals:
Polywater LZ is approved by many cable manufacturers. Contact American Polywater for details.

[1] IEEE Std 1210-2004, IEEE Standard Tests for Determining Compatibility of Cable-Pulling Lubricants with Wire and Cable.

[2] UL Subject 267, Investigation for Wire-Pulling Compounds.

PHYSICAL PROPERTIES

PROPERTY	RESULT
Appearance	White, stringy gel
% Nonvolatile solids (weight)	4.0
VOC content	0 gms/L 200 gms/L (Winter Grade)
Viscosity (Brookfield)	35,000-50,000 cps @10 rpm
pH	6.5-7.5

PERFORMANCE PROPERTIES

Cling factor is a measure of the ability to apply the lubricant and have it stay on the jacket while the cable enters the conduit.

A six-inch length (152 mm) of a one-inch (25 mm) diameter cable will hold at least 35 grams of Polywater LZ for one minute when held vertically at 70°F (21°C).

Coatability:
Coatability is a measure of the lubricant's ability to coat the jacket as a thin film for continued lubricity on longer pulls.

Polywater LZ will wet out evenly on cable jacket surfaces. It will not bead up or rub off the jacket sample. A one-inch (25 mm) diameter XLPE cable dipped six inches (152 mm) into Polywater LZ, then withdrawn and held vertically, will retain at least 25 grams of Polywater LZ for one minute at 70°F (21°C).

Combustibility:
Combustibility is a measure of combustion properties of the lubricant residue in a fire situation (with an impinging heat flux).

Polywater LZ has no flash point and its dried residue will not support combustion and spread flame. A 15-gram sample of the Polywater LZ, when placed in a one-foot, split, metal conduit and fully dried for 24 hours at 105°C, will not ignite and spread a flame more than three inches beyond the point of ignition when subjected to a continuous heat flux of 85 kW/m^2. The total test time was 30 minutes.

Test method described in "Fire Parameters and Combustion Properties of Cable Pulling Compound Residues," presented to the International Wire & Cable Symposium, 1987.

APPLICATION PROPERTIES

Application Systems:
Polywater LZ has a stringy gel consistency that makes it easy to lift, carry, and hand-apply.

Polywater LZ can also be pumped directly into the conduit or onto the cable using the Polywater LP-D5 specialty lubricant pump. This allows hands-free transfer and consistent application of lubricant. Polywater's low-shear pump will not change the gel character of Polywater LZ. The LP-D5 pump applies lubricant at a rate of 1-2 gallons (4-8 liters) per minute.

Polywater LZ Front End Packs are bag packages that "prelubricate" the head end of the cable during the pull. The Front End Pack attaches to the winch line and prelubricates as it goes through the conduit. Two sizes are available to fit 2" and larger conduits.

Pull-Planner™ Tension Calculation Software is available from Polywater. Pulling tension estimations can ensure the use of appropriate pulling equipment and that the cable is installed within safe limits.

Polywater LZ is also available in a special-order, pourable version (lower viscosity) called Polywater PLZ.

Temperature Use Range:
Polywater LZ:
20°F to 120°F (-5°C to 50°C).
Polywater WLZ (Winter Grade version):
-20°F to 120°F (-30°C to 50°C)

Temperature Stability:
Polywater LZ will not phase-out or separate after five freeze/thaw cycles or 5-day exposure at 120°F (50°C).

Clean-up:
Polywater LZ is nonstaining. Complete clean-up is possible with water.

Storage and Shelf Life:
Store Polywater LZ in a tightly sealed container away from direct sunlight. Shelf life is 24 months.

ENVIRONMENTAL PROPERTIES

Aquatic Toxicity:
Polywater LZ is safe in the aquatic environment and passes CCR Title 22 Fathead Minnow Hazardous Waste Screen Bioassay
Result: PASS (LC50 > 750 mg/L)

DIRECTIONS FOR USE

Polywater LZ can be hand-applied or pumped onto the cable as it enters the conduit.

For long pulls, place approximately two-thirds of the recommended quantity of lubricant into the conduit using the Front End Packs or by pumping.

For Front End Packs use, attach the packs of Polywater LZ to the winch line or pulling rope in front of the cable by using tape or cable ties. Start the pull and slit open the entire length of the pack(s) with a sharp knife as it enters the conduit.

Supplement with direct jacket lubrication as the cable enters the conduit.

Clean up by wiping off any excess lubricant with a rag.

Recommended Lubricant Quantity:

$$Q = k \times L \times D$$

Where:

Q = quantity in gallons (liters)

L = length of conduit run in feet (meters)

D = ID of the conduit in inches (mm)

k = 0.0015 (0.0008 if metric units)

The quantity that is appropriate for any given pull can vary from this recommendation by 50%, depending on the complexity of the pull. Consider the following factors:

Cable weight and stiffness
(Increase quantity for stiff, heavy cable)

Conduit condition
(Increase quantity for old, dirty, or rough conduits)

Conduit fill
(Increase quantity for high percent conduit fill)

Number of bends
(Increase quantity for pulls with several bends)

Pulling environment
(Increase quantity for high temperatures)

MODEL SPECIFICATION

The statement below may be inserted into a specific job specification to help maintain engineering standards and ensure project integrity.

The cable pulling lubricant shall be Polywater® LZ Lubricant. The lubricant shall be UL (or CSA) listed. The cable pulling lubricant shall provide excellent friction reduction with good cling and wetting through long pulls and multiple bends. The lubricant shall leave minimal, noncombustible residue. It shall be compatible with most cable jacket materials and be extensively tested on a broad variety of low smoke, halogen-free cable jacket materials.

Cable jacket compatibility shall be tested with the specific LSZH jacket material used on the cable. Test data shall be provided by the cable manufacturer or the lubricant manufacturer. It shall not stress-crack polyethylene per ASTM Standard 1693. There shall be no significant changes in the conductive properties of XLPE and EPR semi-conducting compounds when the lubricant's effect on volume resistivity is tested according to IEEE Standard 1210.

A 15-gram sample of the lubricant, when placed in a one-foot, split metal conduit and fully dried for 24 hours at 105 degrees C, shall not spread a flame more than three inches beyond a point of ignition at a continued heat flux of 85 kW/meter^2. Total time of test shall be 30 minutes.

ORDER INFORMATION

CAT #	PACKAGE DESCRIPTION
LZ-55	½-gal. bag in a box (1.9 liters) 6/case
LZ-110	½-gal. bag in a pail (1.9 liters) 10/pail
LZ-35	1-qt. squeeze bottle (.95 liter) 12/case
LZ-128	1-gal. pail (3.78 liter) 4/case
LZ-640	5-gal. pail (18.9 liter)
LZ-DRUM	55-gal. drum (208 liter)
	Winter Grade
WLZ-55	½-gal. bag in a box (1.9 liters) 6/case
WLZ-110	½-gal. bag in a pail (1.9 liters) 10/pail
WLZ-35	1-qt. squeeze bottle (.95 liter) 12/case
WLZ-128	1-gal. pail (3.78 liter) 4/case
WLZ-640	5-gal. pail (18.9 liter)

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