American Polywater® Corporation

11222 60th Street North Stillwater, MN
55082-9310

Telephone:1-651-430-2270
In U.S.A. & Canada:
1-800-328-9384
FAX: 1-651-430-3634

http://www.polywater.com
Customer Service: support@polywater.com
Purchase Orders:
orderentry@polywater.com

Follow us on twitter: twitter.com/PolywaterE
Like Us on Facebook
facebook.com/polywater

**To enhance your catalog viewing - please use FireFox web browser or download onto your hard drive*

American Polywater® Corporation

11222 60th Street North
Stillwater, Minnesota 55082 U.S.A.

Telephone: 1-651-430-2270
800-328-9384 FAX: 1-651-430-3634

www.polywater.com
support@polywater.com

TO: Consulting Electrical Engineers

SUBJ: Cable Pulling Lubricant Specification

WHY SPECIFY A CABLE LUBRICANT?

Why specify something that is not a functioning part of an electrical system, such as a cable pulling lubricant? "All cable lubricants are the same!" ***Or, are they?***

LUBRICANT'S SIGNIFICANCE!

The **differences** between lubricant types can affect both cable life and the safety of the projects you engineer.

- *Wax emulsions can damage certain types of insulation and high voltage shields.*
- *The residue from wax emulsions is combustible and can propagate flame.*
- *The residue left after a wax emulsion dries can hinder future cable removal or pulls.*

American Polywater Corporation is the recognized leader in the technology of polymeric cable lubricants. Our premier, high-performance electrical cable lubricant**, Polywater® LZ** is a safe, water-based product without the drawbacks of a wax emulsion**. Polywater® LZ** has been specified and used extensively in construction, based on its proven effectiveness, compatibility, safety, and application properties.

POOR INSTALLATION CAUSES FAULTS!

Cable manufacturers agree that **most cable faults** occur because of mechanical stress on the cable jacket during installation. **Polywater® LZ** has a low friction coefficient, which will minimize such mechanical stress.

ADDITIONAL INFORMATION?

In addition to the technical data in this catalog, we have available a formal presentation and video covering "Cable Installation Engineering." Topics covered are:

1. *Friction theory and its effect on cable installation tension.*
2. *Accurate coefficient of friction determination and its use in planning conduit systems.*
3. *Use of a personal computer with the Pull-Planner™ 3000 Software Program to easily design conduit systems.*
4. *Lubricant performance differences.*

A pre-written model lube specification is available online at
http://www.polywater.com/modelspc.html

To schedule a presentation on this subject, go to:
www.polywater.com/seminar.pdf

For additional technical information, please call us toll free at 1-800-328-9384.

American Polywater® Corporation

11222 60th Street North
Stillwater, Minnesota 55082 U.S.A.

Telephone: 1-651-430-2270,
800-328-9384 FAX: 1-651-430-3634

www.polywater.com
support@polywater.com (e-mail)

Recommended Lubricant Quantity

Our recommendation on the amount of Polywater® Cable Lubricant to use is dependent only on the size and length of the conduit system. Our research indicates that the following equation predicts a satisfactory quantity of Polywater® Lubricant for an average cable pull.

$$Q = .0015 \times L \times D$$

Where: Q = Quantity needed in gallons
L = Length of conduit in feet
D = nominal ID of conduit in inches

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

- **Cable weight and jacket hardness**
  (Increase quantities for stiff, heavy cable)
- **Conduit Type and Condition**
  (Increase quantities for old, dirty, or rough conduits)
- **Conduit Fill**
  (Increase quantities for high percent conduit fill)
- **Number of Bends**
  (Increase quantities for pulls with several bends)
- **Pulling Environment (heat, water, etc)**
  (Increase quantities for high temperatures)

The following chart indicates approximate pulling lubricant requirements for various cable pulls, based on the formula above.

Lubricant Quantities in Gallons

		Conduit ID in Inches			
		1”	**2”**	**3”**	**4”**
Pull Length in Feet	200	.3	.6	.9	1.2
	400	.6	1.2	1.8	2.4
	600	.9	1.8	2.7	3.6
	800	1.2	2.4	3.6	4.8
	1000	1.5	3.0	4.5	6.0

For cable pulling tips and research, visit our Engineer’s Corner online at http:www.polywater.com/engineer.asp

American Polywater's Pull-Planner™ 3000 Software

The Pull-Planner™ 3000 For Windows™ calculates cable pulling tension and sidewall pressure using the Riffenberg pulling equations. Tension estimates are useful in designing conduit systems and planning cable pulls. Such planning can save time and money by minimizing splices, vaults, pulling setups, etc., while ensuring installation tensions that won't damage cable.

New Features

- Calculate and recalculate tensions and sidewall pressures automatically during easy changes of friction coefficient, cable data, incoming tension, or pull direction. Cable, conduit, and friction data have been updated to include new LSZH jackets and HDPE conduit.

- Establish a custom cable data file (up to 100 cables) with your common cables by name, type, weight, and OD. These standard cables are available for quick data entry. Longer cable descriptions are now accepted.

- Print pull details and calculation results to a Windows™ printer or paste the data into other Windows™ programs. New links to application, product and other reference literature.

- Determine "maximum" allowable cable tension and/or sidewall pressure and "flag" calculations when maximum tension is surpassed. Separate straight sections from bends and vary the coefficient of friction by segment for different conduits, cable tray, and bends. Add a pushing force for push/pull calculations.

- Add, subtract, change, or insert conduit segments in a pull for analysis. Direct click on the data cell to change segment data. New graphics have been added to assist in bend selection.

- Back calculate an effective friction coefficient from field measured tensions – useful for additional calculations in similar environments. New large radius bend calculations are used for HDD conduit installations or other large radius sweeps.

Ordering information

Call 1-800-328-9384 or visit www.polywater.com/order.asp to place your order. The Pull-Planner™ 3000 For Windows™ runs on numerous Windows™ operating systems. $129.00 Retail. $59.00 Upgrade.

Pull Planner™ Preview Page: www.polywater.com/preview.html
Technical Article: www.polywater.com/3000tech.html
Special offer: www.polywater.com/pp3koffr.html

Makers of Polywater® and Dyna-Blue® Cable Lubricants and Bonduit® Conduit Adhesive

American Polywater® Corporation

11222 60th St. N.
Stillwater, MN 55082
U.S.A
1-800-328-9384
www.polywater.com (URL) 1-651-430-2270
support@polywater.com fax 1-651-430-3634

LIT-PP3000FLYER/REV000

Polywater® Lubricant LZ

Universal Cable Lubricant

- Developed for LSZH/LSHF, CPE, CSPE & Hypalon® cables
- Compatible With All Cable Jackets
- Specification Grade
- Temperature Stable Non-Combustible Residue
- Low Coefficient of Friction
- Clean & Non-Staining
- Application System
- UL & ULC Listed
- Available in Cold Weather Formula

Polywater® LZ was formulated for universal cable compatibility. Over 30 years of cable lubricant development led to this new "super lube" product. It meets the performance needs of power plants, mass transit systems, airports, petrochemicals, high-occupancy buildings, and other construction projects using LSZH CPE, CSPE or Hypalon® power, control, instrumentation, and communication cables.

Polywater® Lubricant LZ

Do you specify or install low-smoke zero-halogen, Hypalon®, CPE or CSPE cables?

Ensure the integrity of electrical construction projects by specifying an appropriate cable pulling lubricant. Many commercially available pulling lubricants weaken LSZH/LSHF jackets and should not be used on these cables.

Recommendations

Engineers should specify a cable pulling lubricant that does not negate the fire suppression effectiveness of fire-retardant cables or degrade jacket materials. Performance specifications for lubricants should include physical property effects, jacket compatibility, ignition and flame propagation character of residues, coefficient of friction parameters specific to cable type, and manufacturer approvals. Polywater® LZ is the only lubricant that should be specified for installations of LSZH/LSHF, CPE, CSPE cable in duct.

Caution

Because of ongoing production and formulation advances in cable jacket technology, please verify with cable manufacturers the current status of lubricant compatibility, or contact American Polywater directly for specific jacket details.

Characteristics

1. Polywater® LZ shows excellent lubricity on a variety of cable jacket types. The following COF's were measured using
   Rigid Steel conduit:
   LSZH .15, CPE .13, CSPE .21, LLDPE .10;
   FRP conduit:
   LSZH .17, CPE .17, CSPE .24, LLDPE .11;
   PVC conduit:
   LSZH .07, CPE .10, CSPE .16, LLDPE .05;
   Method described in "Coefficient of Friction Measurement on Polywater's Friction Table, 2007." Typical values determined using 200 lbs/ft normal force.
2. Polywater® LZ dries slippery. It leaves little residue and won't cement cables into conduit.
3. Polywater® LZ does not contain wax or grease.
4. Polywater® LZ has a wide temperature use range:
   Polywater® LZ, 20°F to 120°F (-5°C to 50°C)
   Winter grade Polywater® WLZ, -20°F to 120°F (-30°C to 50°C)
5. Polywater® LZ passes IEEE 1210 physical and electrical testing on a wide variety of cable materials. It does not stress crack polyethylene. Refer to the technical bulletin for details.
6. Polywater® LZ is stable and will not separate after exposure to high heat or freezing.
7. Polywater® LZ will not stain sheet rock, carpet, concrete or clothing. Wipe up excess product when necessary.
8. Polywater® LZ has no flash point and dried residue will not support or spread flame. Test supported by a modified version of IEEE 383, vertical flame tray test.

Package Size	Polywater® LZ Product #	Winter Grade Product #	Units/Case
55-gallon drum (208 liters)	LZ-Drum	WLZ-Drum	1
5-gallon pail (18.9 liters)	LZ-640	WLZ-640	1
1-gallon pail (3.8 liters)	LZ-128	WLZ-128	4
1/2-gallon Front End Pack™ (1.9 liters) (in 5-gal pail)	LZ-110	WLZ-110	10
1-quart bottle (0.95 liters)	LZ-35	WLZ-35	12

To view technical information on our website go to:
Support Page: www.polywater.com/polyLZ.asp
Lubricant Application Videos: www.polywater.com/videos.asp

American Polywater® Corporation
phone: 1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
email: support@polywater.com
11222 60th St. N, Stillwater, MN 55082, U.S.A

ADHESIVES | CLEANERS | **LUBRICANTS** | SEALANTS WWW.POLYWATER.COM

LIT-LZFLYER/REV001

Polywater® LZ
High Performance Lubricant

American Polywater® Corporation

TECHNICAL SPECIFICATION

Description:

Polywater® Lubricant LZ is a high-performance, specification-grade, cable pulling lubricant. This newest Polywater® Lubricant was developed for compatibility with the broad variety of modern 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. Lubricant LZ does not sustain flame when used with fire-retardant cables and systems. Its dried residue is non-conductive and non-combustible.

Polywater® Lubricant LZ is a stringy gel. It can be applied by hand or using Polywater's LP Pumps. It is also available in the unique Front End Pack™ pre-lubrication bags.

Friction Testing:

Lubricity: Polywater® LZ Lubricant 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, 2007" (polywater.com/FTable.pdf). Values are averages based on cable jacket and conduit materials from multiple manufacturers.

Cable Jacket	Conduit Type				
	Steel	FRP	HDPE	PVC	EMT
LSZH	.15	.17	.07	.07	.21
CSPE	.21	.24	.12	.16	.24
CPE	.13	.17	.06	.10	.16
XLPE	.10	.12	.04	.05	.11
LLDPE	.10	.11	.04	.05	.13

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

Product Benefits:

- Specification grade
- Compatible with cable jacket materials
- Extensively tested on LSZH compounds
- Excellent friction reduction
- High cling factor
- Non-combustible residue
- Clean and non-staining
- Temperature stable

End Use:

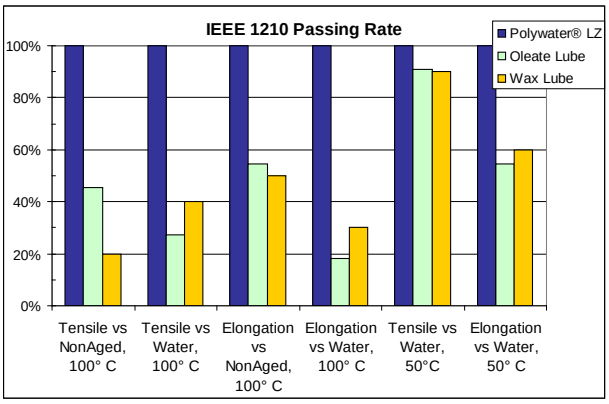
Suitable for all types of cable installations, including:

- Nuclear and other generation plants
- Mass transit systems
- Oil and petrochemical
- Other critical fire areas
- Multi-bend cable pulls

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 jacket 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 Lubricant as tested by UL requirements[2].

Cable Approvals:
Polywater® Lubricant 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.*

Performance Properties

Cling Factor:
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® Lubricant 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 of the jacket sample. A one-inch (25 mm) diameter XLPE cable dipped six inches (152 mm) into Polywater® Lubricant LZ, then withdrawn and held vertically, will retain at least 25 grams of Polywater® Lubricant 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 LZ Lubricant, 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 one-half hour.

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

Physical Properties:

Property	Result
Appearance:	White, stringy gel
% Non-Volatile Solids (weight):	4.0
VOC content:	0 gms/L 200 gms/L (wintergrade)
Viscosity (Brookfield):	35,000 – 50,000 cps @10 rpm
pH:	6.5 – 7.5

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-3 or LP-D5 specialty lubricant pumps. Pumps allow hands-free transfer and consistent application of lubricant. Polywater's low-shear pumps will not change the gel character of LZ lubricant. The LP-3 and LP-D5 pumps support lubricant application rates of 1 to 3 gallons (4 to 11 liters) per minute.

Polywater® LZ Front End Packs™ are bag packages that "pre-lubricate" the head end of the cable during the pull. The Front End Pack™ attaches to the winch line and pre-lubricates 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. PLZ is primarily for underground work where pouring the lubricant into a cable feeder tube is a convenience.

Temperature Use Range:
Polywater® LZ:
20°F to 120°F (-5°C to 50°C).
Polywater® WLZ (wintergrade 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 non-staining. Complete clean-up is possible with water.

Storage and Shelf Life:
Store Polywater® LZ in a tightly sealed container away from direct sunlight. Lubricant shelf life is one year.

Directions for Use:

Polywater® LZ Lubricant 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 cable pulling lubricant shall provide excellent friction reduction with good cling and wetting through long pulls and multiple bends. The lubricant shall leave minimal, non-combustible 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 one-half hour.

Order Information:

Cat #	Package Description
	Regular
LZ-27	1-qt bag in a box (0.95 liter)
LZ-99	1-qt bag in a pail (0.95 liters)
LZ-55	½-gal bag in a box (1.9 liters)
LZ-110	½-gal bag in a pail (1.9 liters)
LZ-35	1-qt squeeze bottle (.95 Liter)
LZ-128	1-gallon pail (3.78 Liter)
LZ-640	5-gallon pail (18.9 Liter)
LZ-DRUM	55-gallon drum (208 Liter)
	Wintergrade
WLZ-55	½-gal bag in a box (1.9 liters)
WLZ-110	½-gal bag in a pail (1.9 liters)
WLZ-35	1-qt squeeze bottle (.95 liter)
WLZ-128	1-gallon pail (3.78 liter)
WLZ-640	5-gallon pail (18.9 Liter)
	Pourable
PLZ-128	1-gallon pail (3.78 Liter)
PLZ-640	5-gallon pail (18.9 Liter)

Lit-LZTech/REV000

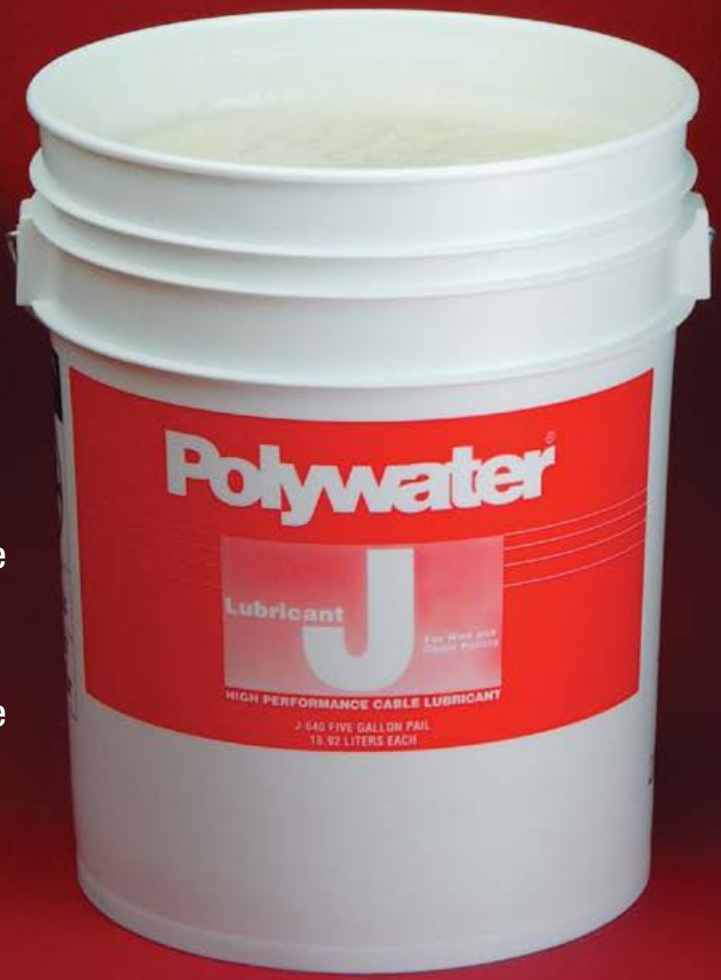
Makers of Polywater® and Dyna-Blue® Cable Lubricants and Pull-Planner™ 3000 Software

American Polywater® Corporation

11222 60th St. N
Stillwater, MN 55082
U.S.A
1-800-328-9384
1-651-430-2270
fax 1-651-430-3634
www.polywater.com (URL) support@polywater.com (e-mail)

Polywater® Lubricant J

Proven High Performance Cable Lubricant For Heavy Cable Installations



- Maximum Friction Reduction
- Compatible With Most Cables
- Temperature Stable
- Non-Combustible Residue
- Specification Grade

- Clean & Non-Staining
- High Cling Factor
- Application System
- UL & CSA Listed
- Available in Cold Weather (non-freezing) Formula

Polywater® Cable Lubricant J

Polywater® Lubricant J is a high-performance, clean, slow-drying, water-based gel lubricant. Lubricant J provides maximum tension reduction in all types of cable pulling. It is especially recommended for long pulls, multiple-bend pulls and pulls in a hot environment. Lubricant J dries to form a thin lubricating film that retains its lubricity for months after use.

Polywater® Lubricant J is a specification-grade lubricant that does not promote flame propagation when used with fire-retardant cables and systems. It is harmless to humans, environmentally safe, compatible with common cable jacket materials, and can be easily applied as part of the unique Polywater® Lubricant Application System.

Polywater® Lubricant WJ (winter-grade) has the same characteristics as Polywater® Lubricant J and is specifically formulated for use in temperatures as low as -20ºF (-30ºC).

Front End Pack™ is a conduit-sized polyethylene bag of lubricant. The Front End Pack™ travels through the conduit on the winch line, pre-lubricating the conduit ahead of the cable being pulled.

Package Size	Lubricant J Product #	Winter Grade Product #	Units/ Case
55-gal drum (208 L)	J-Drum	WJ-Drum	1
5-gal pail (18.9 L)	J-640	WJ-640	1
1-gal pail (3.9 L)	J-128	WJ-128	4
1/2-gal Front End Pack™ (1.9 L) (in 5-gal pail)	J-110	WJ-110	10
1-qt Front End Pack™ (0.95 L) (in 5-gal pail)	J-99	WJ-99	16
1/2-gal Front End Pack™ (1.9 L) (in corrugated carton)	J-55	WJ-55	6
1-qt (0.95 L) squeeze bottle	J-35	WJ-35	12
1-qt Front End Pack™ (0.95 L) (in corrugated carton)	J-27	WJ-27	12

Characteristics

1. Polywater® J shows excellent lubricity on a variety of cable jacket types. Using PVC conduit, the following COF's were measured:
   PVC .11, XLPE .11, LLDPE .11, CPE .11,
   HDPE .09, THHN .13, XHHW .11
   Method described in "Coefficient of Friction Measurement on Polywater's Friction Table, 2007." Typical values determined using 200 lbs/ft normal force
2. Polywater® J dries slippery. It leaves residue and will not cement cables into conduit.
3. Polywater® J does not contain wax, grease or silicone.
4. Polywater® J has a wide temperature use range:
   Polywater® J, 20°F to 120°F (-5°C to 50°C)
   Winter-grade Polywater® WJ, -20°F to 120°F (-30°C to 50°C)
5. Polywater® J passes IEEE 1210 physical and electrical testing on a wide variety of cable materials. It does not stress crack polyethylene. Refer to the technical bulletin for details.
6. Polywater® J is stable and will not separate after exposure to high heat or freezing.
7. Polywater® J will not stain sheet rock, carpet, concrete or clothing. Wipe up excess product when necessary.
8. Polywater® J has no flash point and dried residue will not support or spread flame. Test supported by a modified version of IEEE 383, vertical flame tray test.

To view technical information on our website go to:
Support Page: www.polywater.com/polyj.html
Application Videos: www.polywater.com/videos.asp

American Polywater® Corporation
phone: 1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
email: support@polywater.com
11222 60th St. N., Stillwater, MN 55082, U.S.A

LIT-JFLYER/REV000

Polywater® J
High Performance Lubricant

American Polywater® Corporation

TECHNICAL SPECIFICATION

Description:

Polywater® Lubricant J is a high-performance cable pulling lubricant proven in the installation of millions of feet (meters) of cable over the last 20 years. Lubricant J provides excellent tension reduction in underground and industrial cable pulls. It is recommended for both communications and electrical cable. Polywater® J has excellent shear resistance for effective lubrication under high cable sidewall pressure in conduit bends.

The residue from Polywater® J does not propagate flame when used with fire-retardant cable systems. Lubricant J is slow drying. The residue is a thin, slippery film that retains its lubricity for months after use. Its dried residue is non-conductive and non-combustible.

Polywater® Lubricant J is a stringy gel. It can be applied by hand or using Polywater's LP Pumps. It is also available in the unique Front End Pack™ pre-lubrication bags.

Friction Testing:

Lubricity: Polywater® J Lubricant 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, 2007" (polywater.com/FTable.pdf). Values are averages based on cable jacket and conduit materials from multiple manufacturers.

Cable	Conduit Type				
Jacket	HDPE	PVC	Steel	FRP	EMT
XLPE	.14	.11	.13	.16	.21
LLDPE	.10	.11	.16	.13	.13
PVC	.11	.11	.13	.16	.11
HDPE	.05	.09	.13	.13	.13

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

Product Benefits:

- Specification grade
- Excellent friction reduction
- High cling factor
- Non-combustible residue
- Clean and non-staining
- Temperature stable

End Use:

Suitable for many types of cable installations, including:

- Heavy, underground installations
- Multiple-bend pulls
- Long pulls
- High conduit fill situations

Official Approvals:

UL Approved
CSA Listed

Cable Compatibility:

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

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

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 XHHW building wire meet UL tensile, elongation, and voltage withstand requirements after exposure to Polywater® J Lubricant as tested by UL requirements[2].

Nuclear Approval:
Polywater® J Lubricant does not contain halogenated compounds, sulfur compounds, or low melting point metals.[3]

Cable Approvals:
Polywater® J Lubricant is approved by most 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.*

[3] *Nuclear Test Methodology: Leachable Chlorides (ASTM D 512-88), Water Leachable Bromides (ASTM D 1246-88) Halogenated Compounds (ASTM D 808-87) Water Leachable Iodides (ASTM D 1246-88) Sulfur (ASTM D 129-78) Water Leachable Fluorides (ASTM D 1179-88)*

Performance Properties

Cling Factor:
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 50 grams of Polywater® Lubricant J for one minute when held vertically at 70° F (21° C).

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

Polywater® J will wet out evenly on cable jacket surfaces. It will not bead up or rub off of the jacket sample. A one-inch (25 mm) diameter XLPE cable dipped six inches (152 mm) into Polywater® J, then withdrawn and held vertically, will retain at least 30 grams of Polywater® Lubricant J 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® J has no flash point and its dried residue will not support combustion and spread flame. A 200-gram sample of the J Lubricant, 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 a point of ignition when subjected to a continuous heat flux of 40 kW/m^2. The total test time was one-half hour.

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

Physical Properties:

Property	Result
Appearance:	Cream-colored, stringy gel
Wax, Grease and Silicone Content:	None
Percent Non-Volatile Solids:	4.3
VOC Content:	10 gms/liter 200 gms/liter (wintergrade)
Viscosity:	25,000 – 40,000 cps @10rpm
pH:	7.5 – 9.0

Application Properties:

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

Polywater® J can also be pumped directly into the conduit or onto a cable using the Polywater® LP-3 or LP-D5 specialty lubricant pumps. Pumps allow hands-free transfer and consistent application of lubricant. Polywater's low-shear pumps will not change the gel character of Polywater® J lubricant. The LP-3 and LP-D5 pumps support lubricant application rates of 1 to 3 gallons (4 to 11 liters) per minute.

Polywater® J Front End Packs™ are bag packages that "pre-lubricate" the head end of the cable during the pull. The Front End Pack™ attaches to the winch line and pre-lubricates 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® J is also available in a pourable version (lower viscosity) called Polywater® PJ. PJ is primarily for use in underground work where pouring the lubricant into a cable feeder tube is a convenience.

Temperature Use Range:
Polywater® J:
20°F to 120°F (-5°C to 50°C).
Polywater® WJ (wintergrade version):
-20°F to 120°F (-30°C to 50°C).

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

Clean-Up:
Polywater® J is non-staining. Complete clean-up is possible with water.

Storage and Shelf Life:
Store Polywater® J in a tightly sealed container away from direct sunlight. Lubricant shelf life is one year.

Directions for Use:

Polywater® J Lubricant can be hand applied or pumped onto the cable as it enters the conduit. Polywater® PJ is a thinner gel and can be poured.

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 Pack™ use, attach the packs of Polywater® J to the winch line or pulling rope in front of the cable 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® J Lubricant. The lubricant shall be UL (or CSA) listed. The lubricant shall contain **no** waxes, greases, silicones, or polyalkylene glycol oils. Lubricant manufacturer must provide cable manufacturer approvals upon request.

Cable jacket compatibility shall be tested by the IEEE 1210, Standard Tests for Determining Compatibility of Cable-Pulling Lubricants with Wire and Cable. It shall pass physical compatibility tests on LLDPE, XLPE, PVC and EPR cable jacket or sheath materials. 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 200-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 40 kW / meter^2. Total time of test shall be one-half hour.

Order Information:

Cat #	Package Description
	Regular
J-35	1-quart squeeze bottle (0.95 liter)
J-128	1-gallon pail (3.78 liter)
J-640	5-gallon pail (18.9 liter)
J-27	1-quart bag (0.95 liter)
J-99	1-quart bag (0.95 liter) in a pail
J-55	½-gallon bag (1.9 liter)
J-110	½-gallon bag (1.9 liter) in a pail
J-Drum	55-gallon drum (208 liter)
	Pourable
PJ-128	1-gallon pail (3.78 liter)
PJ-320	2 ½- gallon jug (9.6 liter)
PJ-640	5-gallon pail (18.9 liter)
PJ-Drum	55-gallon drum (208 liter)
***Wintergrade version Polywater® PJ available (WPJ)*	
	Wintergrade
WJ-35	1-quart squeeze bottle (0.95 liter),
WJ-55	½-gallon bag (1.9 liter)
WJ-110	½-gallon bag (1.9 Liter) in a pail
WJ-128	1-gallon pail (3.78 liter)
WJ-640	5-gallon pail (18.9 liter)
WJ-Drum	55-gallon drum (208 liter)

Makers of Polywater® and Dyna-Blue® Cable Lubricants and Pull-Planner™ 3000 Software

American Polywater® Corporation

11222 60TH St. N
Stillwater, MN 55082
U.S.A
1-800-328-9384
1-651-430-2270
fax 1-651-430-3634
www.polywater.com (URL) support@polywater.com (e-mail

Polywater®

FRONT END PACK™

CABLE LUBRICATING SYSTEM

Polywater® Front End Packs™ lubricate ahead of the cable during the pull. They eliminate the need for hand lubrication in many pulls. Proper Front End Pack™ use lubricates far down the conduit where normal lubrication is inadequate.

Sizes

Two different sizes; a 1-quart pack (J-27/J-99) and a 1/2-gallon pack (J-55/J-110) are available.

- The 1-quart pack is 1¾" in diameter by 24" long and is used in 2" and 3" conduit.
- The 1/2 -gallon pack is 3" in diameter by 14" long and is used in 3½" and larger conduit.

Package Size	Polywater® J Product #	Winter Grade Product #	Units/Case
1/2 –Gal Pack (bag)	J-110	WJ-110	10 Packs in a 5-gal Pail
1/2-Gal Pack (bag)	J-55	WJ-55	6 Packs in a Carton
1-Qt Pack (bag)	J-99	WJ-99	16 Packs in a 5-Gal Pail
1-Qt Pack (bag)	J-27	WJ-27	12 Pack in a Carton

Quantity Formula

When only Front End Packs™ are used for a pull, the number of packs recommended for a pull is:

N = 0.003 x T x L x D

N = Number of packs required

T = (1) for J-55/J-110 packs or (2) for J-27/J-99 packs

L = Length of pull in feet

D = Nominal I.D. of conduit in inches

The quantity appropriate for a difficult pull may be up to +50% above this average, depending on conduit fill, conduit type and condition, number of bends, and pulling environment.

To view technical information on our website go to:
Lubricant Application Videos: **www.polywater.com/videoslube.asp**
Written Instructions: **www.polywater.com/frontend.html**

American Polywater® Corporation
phone: 1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
email: support@polywater.com
11222 60th St. N., Stillwater, MN 55082, U.S.A

ADHESIVES | CLEANERS | **LUBRICANTS** | SEALANTS WWW.POLYWATER.COM

LIT-FEPFLYER/REV001

Polywater® PJ

POURABLE LUBRICANT

Polywater® PJ Pourable Lubricant is a pourable version of the popular Polywater® J High Performance Pulling Lubricant. "PJ" offers the same proven features as "J" in such key areas as lubricity, cable compatibility, residue fire resistance, and ease of cleanup—yet it's easier to apply where pouring is practical.

WHY A POURABLE LUBRICANT? APPLICATION! CONVENIENCE!!

- For the horizontal pulls typical in underground construction, Polywater® PJ pours directly into the feeder or guide funnel, avoiding the mess of hand application. No need to touch or handle the lube . . . less cleanup time! Perfect for vertical stub up applications.
- Polywater® PJ Lubricant's viscosity makes it easier to spread the lubricant throughout a conduit, providing effective lubrication at all friction points.

Package Size	Polywater® PJ Product#	Units/Case
55-gallon drum (208 liters)	PJ-DRUM	1
5-gallon pail (18.9 liters)	PJ-640	1
2 ½ gallon jug (9.6 liters)	PJ-320	2
1-gallon jug (3.8 liters)	PJ-128	4

**Also available in a winter-grade formula*

To view technical information on our website go to:
Support Page: www.polywater.com/polypj.html
Application Videos: www.polywater.com/videos.asp

Characteristics:

1. Polywater® PJ shows excellent lubricity on a variety of cable jacket types. Using PVC conduit, the following COF's were measured: PVC .11, XLPE .11, LLDPE .11,

   Method described in "Coefficient of Friction Measurement on Polywater's Friction Table, 2007." Typical values determined using 200 lbs/ft normal force.
2. Polywater® PJ dries slippery. It leaves little residue and won't cement cables into conduit.
3. Polywater® PJ does not contain wax, grease or silicone.
4. Polywater® PJ has a wide temperature use range: 20°F to 120°F (-5°C to 50°C)
5. Polywater® PJ passes IEEE 1210 physical and electrical testing on a wide variety of cable materials. It does not stress crack polyethylene. Refer to the technical bulletin for details.
6. Polywater® PJ is stable and will not separate after exposure to high heat or freezing.
7. Polywater® PJ will not stain sheet rock, carpet, concrete or clothing. Wipe up excess product when necessary.
8. Polywater® PJ has no flash point and dried residue will not support or spread flame. Test supported by a modified version of IEEE 383, vertical flame tray test.

American Polywater® Corporation
phone: 1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
email: support@polywater.com
11222 60th St. N., Stillwater, MN 55082, U.S.A

ADHESIVES | CLEANERS | **LUBRICANTS** | SEALANTS WWW.POLYWATER.COM

LIT-PJFLYER/REV000

Polywater®

Lubricant Pump

Model LP-D5

Use your ½-inch drill to pump pulling lubricant from a 5-gallon pail or a 55-gallon drum.

Now includes two hands-free applicators for ½ to 6-inch conduits.

The Polywater® Lubricant LP-D5 Pump is a ½-inch drill-operated, self-priming, gear pump. Now includes two hands-free applicators (small for 1½ to 3-inch and large for 3 to 6-inch conduits). All Polywater® lubricants can be pumped directly into the conduit or onto the cable during cable installations at rates exceeding 1.5 gallons per minute.

The LP-D5 pump sets directly onto a 5-gallon pail or 55-gallon drum and comes with a 10-foot discharge hose with lubricant applicator.

Advantages

- **Practical Transfer of all Polywater® Lubricants** – Save time and effort in cable pulling. Eliminate hand scooping, messy pouring, and lengthy clean-ups.
- **Variable Pumping Capability** – Adjustable speed ½-inch drill allows pump to deliver lubricants at a rate of 1.5 gallons per minute or higher.
- **Consistent Lubricant Application** – Automates lubricant application with consistent lubrication throughout installation.
- **Convenient** – No hand pumping. Requires battery or ½-inch electric variable speed drill.
- **Easy Maintenance** – Minimum assembly required. Cleans up with water.
- **Corrosion Resistant** – Solid brass body and stainless steel shaft.

Polywater® Lubricant LP-D5 Pump

Operation

For use on 55-gallon drum and 5-gallon pail Open pail or drum. With drum, untie and open liner, then replace drum cover. Set LP-D5 pump in 5-gallon pail or into the 2-inch bung hole of a 55-gallon drum. Attach variable speed drill to LPD5. Insert free end of hose into conduit opening, pail or jug. Set drill to OPERATE IN FORWARD. Start drill to pump lubricant until it is visible at hose end. If installing cable, start pulling cable and start variable speed $^{1/2}$-inch drill to pump lubricant at desired flow rate.

Cleaning

Pump clean tap water through LP-D5 pump until water discharge is clear. Let pump sit for 15 minutes. Run pump again with clean tap water to remove any remaining lubricant. Repeat the process as necessary. Wipe off pump and applicator. Protect from dirt with bag or other cover.

General

Keep dirt and debris away from pump to avoid damage. Avoid running pump dry to prevent damage.

Ordering Information

Catalog #	Description
LP-D5	Drill Powered pump for 5-Gallon Pail or 55-Gallon Drum. Includes 2 applicators (½-inch drill not included)

Suggested Polywater® Lubricants for pumping application:

Polywater® LZ Cable Pulling Lubricant: www.polywater.com/polylz.asp

Polywater® J Cable Pulling Lubricant: www.polywater.com/polyj.html

Polywater® PJ Pourable Cable Lubricant: www.polywater.com/polypj.html

To view technical information on our website go to:

Support Page: www.polywater.com/pumplpd5.asp

Application Videos: www.polywater.com/videos.asp

American Polywater® Corporation

phone: 1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
email: support@polywater.com
11222 60th St. N., Stillwater, MN 55082
U.S.A

LIT-LP-D5FLYER/REV001

Silicone-based

Polywater® Silicone™

CABLE PULLING LUBRICANTS

Your Best Choice for HDPE and Water-filled Conduits!

- Excellent Lubricant When Pulling Cable Through Water. HIGH CLING FACTOR!
- Optional, Small Frictionless Rollers
- Available in Regular and Winter Grade
- Compatible With Most Cable Jackets
- Superior Friction Reduction
- Suitable for Silicone-lined and Prelubricated Ducts
- Temperature Stable
- Clean and Non-staining

Polywater® Plus Silicone™

Type NN™ is a clean, slow-drying, silicone-based cable pulling lubricant. Type NN™ offers superior friction reduction and is ideally suited for use with HDPE and prelubed ducts. Non-stringy Type NN™ pours and pumps easily, and is suitable for use with all common cable jacket types.

Type WNN™ is a winter-grade Type NN™.

Type NB™ is Type NN™ with small frictionless rollers added.

Type WNB™ is winter-grade Type NB™.

Package Size	Type NN™ Product #	Type WNN™ Product #	Type NB™ Product #	Type WNB™ Product #	Units/Case
55-gallon drum (208 liters)	NN-Drum	WNN-Drum	NB-Drum	WNB-Drum	1
5-gallon pail (18.9 liters)	NN-640	WNN-640	NB-640	WNB-640	1
2 1/2-gallon jug (9.6 liters)	NN-320	WNN-320	NB-320	WNB-320	2
1-gallon jug (3.8 liters)	NN-128	WNN-128	NB-128	WNB-128	4
1-quart bottle (0.95 liter)	NN-35	WNN-35	NB-35	WNB-35	12

To view technical information on our website go to:
Support Page: **www.polywater.com/polyplus.html**
Lubricant Application Videos: **www.polywater.com/videos.asp**

American Polywater® Corporation
phone: 1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
email: support@polywater.com
11222 60th St. N. Stillwater, MN 55082, U.S.A

LIT-NN-NBFLYER/REV000

Polywater® Plus Silicone™ NN Enhanced Lubricant

American Polywater® Corporation

TECHNICAL SPECIFICATION

Description:

Polywater® Plus Silicone™ NN Lubricant is a high-performance, specification-grade, cable pulling lubricant. Lubricant NN provides superior tension reduction and is suitable for all types of cable pulling. It has primarily been used for long pulls of heavy cable. In this type of pulling, its superior tension reduction and continued lubrication while pulling through water are well documented.

Polywater® Plus Silicone™ NN is suitable for use with factory lubricated duct. It continues to lubricate under high sidewall pressure forces in conduit bends. Lubricant NN is slow drying. The residue is a thin, slippery film that retains its slip for months after use.

Polywater® Plus Silicone™ NN is a semi-gel that pours thickly. While it can be applied by hand, it is best to pour or pump the lubricant into the duct system.

Friction Testing:

Lubricity: Polywater® Plus Silicone™ NN Lubricant 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, 2007" (polywater.com/FTable.pdf). Values are averages based on cable jacket and conduit materials from multiple manufacturers.

Cable	Conduit			
Jacket	HDPE	PVC	Steel	FRP
LLDPE	.05	.11	.13	.13
PVC	.08	.09	.13	.10
CPE	.08	.10	.20	.15
XLPE	.07	.08	.13	.14
PP	.07	.05	.07	.10

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

Product Benefits:

- Lubricates through water-filled duct
- Superior friction reduction
- Suitable for factory lubricated conduits
- Clean and non-staining
- Temperature stable
- Specification grade

End Use:

Suitable for all types of cable installations, including:

- Water-filled ducts
- Multiple bends, high sidewall pressure
- Heavy transmission cable
- Long underground pulls
- High conduit fill

Cable Compatibility:

Tensile and Elongation:
LLDPE, HDPE, PP, XLPE, CPE, and PVC cable jacket materials aged in Polywater® Plus Silicone™ NN per IEEE Standard 1210[1] meet the tensile and elongation retention requirements of that standard.

Polyethylene Stress Cracking:
Polywater® Plus Silicone™ NN shows no stress cracking on LLDPE, MDPE, or HDPE cable jacket 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].

Cable Approvals:
Polywater® Plus Silicone™ NN is approved and used by many cable manufacturers. Contact American Polywater for further information.

Field Data:
Polywater® Plus Silicone™ NN has been specified and used on many long, heavy cable installations. Side-by-side comparison pull tension data is available. Contact American Polywater for details.

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

Physical Properties:

Property	Result
Appearance:	Cream-colored, thickly pourable gel
Wax and Grease Content:	None
Non-Volatile Solids (%):	3.5
VOC Content:	10 gms/L 200 gms/L (wintergrade)
Viscosity:	13,000 – 20,000 cps @10rpm
pH:	7.5 – 9.0

Performance Properties:

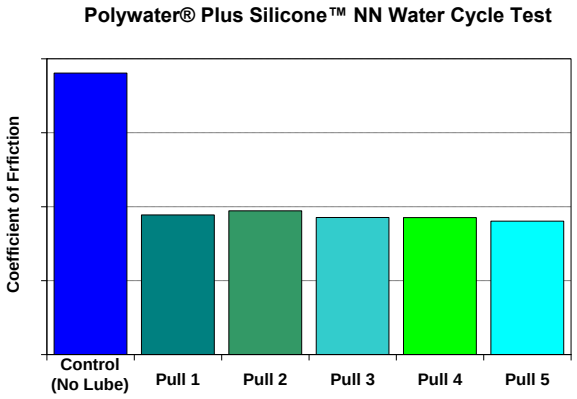
Coatability:
Coatability is a measure of the lubricant's ability to coat the jacket as a thin film for continued lubricity on longer pulls.

Polywater® Plus Silicone™ NN will wet out evenly on cable jacket surfaces. It will not bead up or rub off of the jacket sample. A one-inch (25 mm) diameter XLPE cable dipped six inches (152 mm) into the Polywater® Lubricant NN, then withdrawn and held vertically, will retain at least 15 grams of Polywater® Lubricant NN for one minute at 70° F (21° C).

Friction Reduction through Water:
Friction Reduction through Water is a measure of a lubricant's function through water.

Polywater® Plus Silicone™ NN will not show a significant increase in friction coefficient when tested with five water change cycles as described below.

A cable coated with Polywater® Plus Silicone™ NN Lubricant shall be pulled through HDPE duct wrapped 420° around a three-foot diameter cylinder[2]. The conduit shall be filled with tap water. Twenty-five pounds of back tension shall be put on the cable and the pulling tension measured and friction coefficient calculated as described in the Telcordia test procedure[2]. After each pull (cycle) the conduit shall be cleaned and the water changed. The same cable shall be used for the following cycle. The cable shall not be re-lubricated between cycles.



Actual data from the test (above) shows no change in friction coefficient through five water change cycles.

[2] *Telcordia test procedure TR-TSY-00356 Sections 4.1.3 and 4.1.4*

Application Properties:

Application Systems:
Polywater® Plus Silicone™ NN Lubricant has a semi-gel consistency and can be thickly poured into the conduit or feeder tube.

Polywater® Plus Silicone™ NN can also be pumped directly into the conduit or onto the cable using the Polywater® LP-3 or LP-D5 specialty lubricant pumps. Pumps allow hands-free transfer and consistent application of lubricant. Polywater's low-shear pumps will not change the gel character of NN lubricant. The LP-3 and LP-D5 pumps support lubricant application rates of 1 to 3 gallons (4 to 11 liters) per minute.

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.

A wintergrade version (WNN) *is also available for use during installation work below freezing.*

Temperature Use Range:
Polywater® NN:
20° F to 120° F (-5° C to 50° C).
Polywater® WNN (wintergrade version):
-20° F to 120° F (-30° C to 50° C)

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

Clean-Up:
Polywater® NN (or WNN) is non-staining. Complete clean-up possible with water.

Storage and Shelf Life:
Store Polywater® NN (or WNN) in a tightly sealed container away from direct sunlight. Lubricant shelf life is one year.

Directions for Use:

Polywater® Plus Silicone™ NN Lubricant can be poured or pumped directly onto the cable as it enters the conduit.

To prelubricate for long or difficult pulls, pour Polywater® Plus Silicone™ NN Lubricant into the conduit before the pull begins and spread with a mandrel or a swab on the winch line during the pull. For long horizontal pulls, place as much as two-thirds of the recommended quantity of lubricant into the conduit for prelubrication.

Directly lubricate the cable jacket as it enters the conduit for the entire length of the pull.

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 jacket hardness
(Increase quantity for stiff, heavy cable)

Conduit type and conditions
(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® Plus Silicone™ NN Lubricant. The cable pulling lubricant shall provide a low coefficient of friction on a wide variety of cable jacket materials. The lubricant shall leave a low solids residue of less than 4.0%.

The lubricant shall be compatible with the cable jacket material. Cable jacket compatibility shall be tested by the IEEE 1210, Standard Tests for Determining Compatibility of Cable-Pulling Lubricants with Wire and Cable. The lubricant 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.

The lubricant shall not show a significant increase in friction coefficient over five water change cycles when tested through a water-filled duct via Telcordia test procedure TR-TSY-00356 Sections 4.1.3 and 4.1.4. The cable shall not be re-lubricated during the test.

Order Information:

Cat #	Package Description
	Regular
NN-35	1-quart squeeze bottle (.95 liter)
NN-128	1-gallon pail (3.78 liter)
NN-320	2 ½-gallon jug (9.6 liter)
NN-640	5-gallon pail (18.9 liter)
	Wintergrade
WNN-35	1-quart squeeze bottle (.95 liter)
WNN-128	1-gallon pail (3.78 liter)
WNN-320	2 ½-gallon jug (9.6 liter)
WNN-640	5-gallon pail (18.9 liter)

Lit-NNTech/rev000

Makers of Polywater® and Dyna-Blue® Cable Lubricants and Pull-Planner™ 3000 Software

American Polywater® Corporation

11222 60th St N
Stillwater, MN 55082
U.S.A
1-800-328-9384
1-651-430-2270
fax 1-651-430-3634
www.polywater.com(URL) support@polywater.com(e-mail)

Polywater®

SPY

SPRAY CABLE LUBRICANT

Less Mess!

CONCENTRATED LUBRICANT TECHNOLOGY FOR PULLING OR PUSHING WIRE AND CABLE

Polywater® SPY Spray Lubricant offers an innovative approach to cable lubrication. The concentrated lubricant reduces pulling tension with only a thin coating. Use less with no need to "glop" on pasty wax lubricants. Just spray or wipe to coat the cable jacket. Quick and easy lubrication with no mess.

- Easy Spray or Wipe Application
- Lubricates With a Thin Film
- Works Even When Dry
- Non-Staining - Easy Clean-Up
- UL Listed
- Convenient Application Options

Usage Recommendations

POLYWATER® SPY LUBRICANT WORKS ON ALL TYPES OF JOBS.
LUBRICATE CABLE OR CONDUIT USING ONE OF THE APPLICATION OPTIONS.

Pre-Saturated Towels -- Catalog #SPY-D20

This lightweight and handy package fits easily into tool bags. Use the lubricant-saturated towels to coat the wires as they are pulled. The SPYD20 pop-up package contains 20 tough, non-tearing towels. A neat way to apply lubricant for runs up to several hundred feet.

Refillable Quart Trigger Sprayer -- Catalog #SPY-35LR

For small conduits, the trigger sprayer is a good way to apply the SPY Lubricant. The SPY-35LR quart bottle comes with an industrial-quality, high-volume spray trigger head. For short runs, you can even eliminate fishing by spraying Polywater® SPY and simply pushing the cables. The spray trigger package is reusable and can be refilled from gallon jugs.

Industrial Sprayer -- Catalog #IS-3

For larger installations, liquid Polywater® SPY Lubricant can be applied from a manually pressurized commercial sprayer. Polywater's Industrial Sprayer (IS-3) sprays up to 1/2 gallon per minute. This corrosion-resistant sprayer has a 3-gallon capacity poly container, an 18-inch curved brass extension, a 10-foot flexible heavy-duty hose, and a brass fan-spray nozzle.

Polywater® SPY Spray Lubricant Ordering Information

Package Size	Polywater SPY Product #	Winter Grade Product #	Units/Case
1-quart (.95 liter) bottle with sprayer	SPY-35LR	WSPY-35LR	12
1-gallon (3.8 liter) jug	SPY-128	WSPY-128	4
5-gallon (18.9 liter) pail	SPY-640	WSPY-640	1
20-count saturated wipe dispenser	SPY-D20	WSPY-D20	12
3-gallon (11.4 liter) capacity industrial sprayer	IS-3	IS-3	1

* See http://www.polywater.com/lubeinfo.asp for specific compatibility recommendations.

To view technical information on our website go to:
Support Page: **www.polywater.com/polyspy.asp**
Lubricant Application Videos: **www.polywater.com/videos.asp**

American Polywater® Corporation
phone: 1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
email: support@polywater.com
11222 60th St. N., Stillwater, MN 55082, U.S.A

ADHESIVES | CLEANERS | **LUBRICANTS** | SEALANTS WWW.POLYWATER.COM

Polywater® SPY Cable Lubricant

TECHNICAL SPECIFICATION

Description:

Polywater® SPY Spray Lubricant is a high performance, thin liquid cable pulling lubricant. Lubricant SPY is highly concentrated and works with only a thin coating. Polywater® SPY can be sprayed for easy application, yet has excellent cling and wetting to the cable. Lubricant SPY works even after it has dried. The residue is a thin, slippery film that retains lubricity for months after use.

Polywater® SPY Spray Lubricant is recommended for spray or wipe lubrication with no mess. The lubricant is suitable for all types of cable installations.

Innovation and Function:

Polywater® Lubricant SPY is a thin, concentrated liquid that can be sprayed into the duct or wiped on the cable. Industrial sprayers are available for automatic spraying application. Polywater® SPY is based on unique lubricant chemistry and technology. Much like a paint, the lubricant thins as it is sprayed or wiped. Once on the cable or conduit surface, it thickens to stay coated.

Polywater® SPY reduces friction effectively and compares favorably with the other high-quality Polywater® Lubricants. It has been successfully tested for a variety of uses:

- Lubricating fiberglass rods for easier and longer insertions during fishing.
- Spraying holes in wood studs to reduce tension in hand-pulled Romex wire.
- Eliminating need to fish by allowing shorter runs of wire to be pushed.
- Lowering tension on traditional building wire pulling into EMT or PVC conduits.
- Pressurized spraying for no-mess underground cable installation.

Product Benefits:

- Easy spray or wipe application
- Lubricates with a thin film
- Excellent friction reduction
- Continues to lubricate after drying
- Compatible with cable jackets
- Clean and non-staining
- Convenient

End Use:

Use for all types of cable installations, including:

- General construction
- Hands-free installations
- Automated spray application
- Cables with friction-enhanced jackets

Official Approvals:

UL and C-UL Approved

Cable Compatibility:

Polyethylene Stress Cracking:
Polywater® SPY shows no stress cracking on LLDPE cable jacket when tested per IEEE Standard 1210[1].

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

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® SPY Lubricant as tested by UL requirements[2].

Corrosivity:
Lubricant is non-corrosive to steel, copper, or aluminum. Passes UL 267[2] corrosion testing on zinc-coated EMT.

[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.*

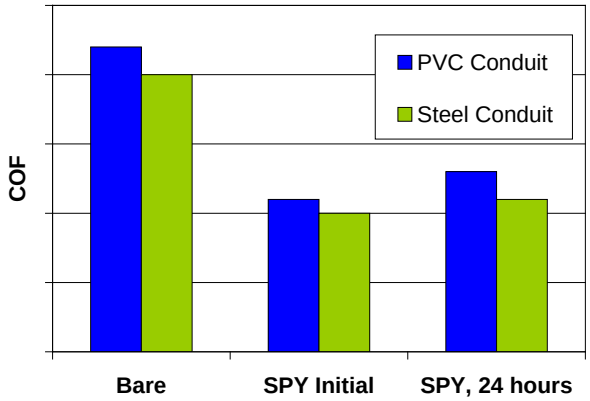
Physical Properties:

Property	Result
Appearance:	Slightly thickened, white liquid
Percent Non-Volatile Solids:	4%
VOC Content:	0 gms/liter
Viscosity:	250-750 cps @10rpm
pH:	7.5 – 9.0

Performance Properties

Dry lubrication
Dry lubrication measurements indicate the capability of thin-film lubricants to continue to lubricate when dry.

Polywater® SPY Lubricant continues to work even after it dries. Coefficient of friction values measured on cable coated and then dried for 24 hours are within 20% of the initial "wet" value. Measurements were done using the Friction Table Method described in the white paper, "Coefficient of Friction Measurement on Polywater's Friction Table, 2007." (polywater.com/FTable.pdf).



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

Polywater® SPY Lubricant will wet out evenly on cable surfaces. It will not bead up or rub off of the cable jacket. Lubricant will completely coat a one-inch diameter THHN or PVC-jacketed cable dipped six inches (152 mm) into the lubricant and then withdrawn after 10 seconds. The lubricant coating shall cover 100% of the immersed cable jacket without dripping off, non-wetting, or drawing back from the edges as the cable is held horizontally for one minute at 70° F (21° C).

Combustibility:
Lubricant has no flash point and dried residue is non-flammable.

Spraying Characteristics:
Low viscosity lubricant allows product to flow through airless spray heads. Lubricant will not clog valves or atomizers on the sprayer.

Application Properties:

Application Systems:
Polywater® SPY Lubricant can be applied in several unique and innovative ways. This thin liquid can be sprayed or wiped directly on the cable jacket. Shorter cable runs can be pushed once the cable is coated with Polywater® SPY. The slightly gelled character of Lubricant SPY helps it to coat and wet the cable for more difficult and complex cable pulls as well.

Wipe Application: For small cables, use the SPY-D20 towelette to wipe the lubricant on the cable jacket. This pre-saturated wipe lays down a thin, even coat of lubricant. The towel material will release the lubricant without a mess.

Trigger Spray Bottle: Use the trigger sprayer on the SPY-35LR bottle to spray Polywater® SPY Lubricant directly on the cable or into the conduit. The bottle can be refilled for multiple uses.

Pressurized Sprayer: For larger installations, apply Polywater® SPY Lubricant from a "pump-up" pressurized commercial sprayer (Cat #: IS-3). Spraying allows for the controlled and consistent, hands-free application of lubricant.

The IS-3 Sprayer can feed up to 0.5 gallon (2 liters) of lubricant per minute. This corrosion-resistant sprayer has a 3-gallon capacity poly container, an 18-inch curved brass extension, a 10-foot flexible heavy-duty hose, and a brass fan-spray nozzle.

Hand Wiping

Pressurized Spraying

Temperature Use Range:
Polywater® SPY:
20° F to 120° F (-5° C to 50° C).
Polywater® WSPY (wintergrade version):
-20° F to 120° F (-30° C to 50° C)

Temperature Stability:
No phase-out after five freeze/thaw cycles or 5-day exposure at 120° F (50° C). *Will not phase out or separate during the shelf life of lubricant.*

Clean-Up:
Non-staining. Complete clean-up is possible with water.

Storage and Shelf Life:
Store Polywater® SPY in a tightly sealed container away from direct sunlight. Lubricant shelf life is one year.

Directions for Use:

Polywater® SPY Lubricant can be sprayed or wiped directly onto the cable as it enters the conduit. Coat the entire cable jacket for best friction reduction.

For short runs, spray an appropriate amount of Polywater® SPY into the conduit before the pull, so the cable will pick up the lubricant as it is pulled.

Polywater® SPY leaves a light, clean residue. Any remaining residue will evaporate quickly.

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 = 0.0005 (0.0004 if metric units)

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

Cable weight and jacket hardness
(Increase quantity for stiff, heavy cable)
Conduit type and conditions
(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® Lubricant SPY. Lubricant has a sprayable viscosity and will not clog valves or applicators. It shall coat and cling to the cable. It shall be non-staining.

Lubricant shall produce a low coefficient of friction on a wide variety of cable jacket materials and shall lubricate at low coating thickness. Lubricant shall continue to reduce friction after it has dried. It shall conform to the physical and electrical requirements of IEEE 1210. It shall not contain solvents and shall not have a flash point.

No substitutions are permitted without certification from an officer of the manufacturer that the substitute product meets all of the requirements of this specification

Order Information:

Cat #	Package Description
	Regular
SPY-D20	20-count wipe canister
SPY-35LR	1-quart spray bottle (0.95 Liter)
SPY-128	1-gallon pail (3.78 Liter)
SPY-640	5-gallon pail (18.9 Liter)
	Wintergrade
WSPY-35LR	1-quart spray bottle (.95 Liter)
WSPY-128	1-gallon pail (3.78 Liter)
WSPY-640	5-gallon pail (18.9 Liter)

Lit-SPYTech/REV000

Makers of Polywater® and Dyna-Blue® Cable Lubricants and Pull-Planner™ 3000 Software

American Polywater® Corporation

11222 60TH St. N
Stillwater, MN 55082
U.S.A
1-800-328-9384
1-651-430-2270
fax 1-651-430-3634
www.polywater.com(URL) support@polywater.com(e-mail)

Dyna-Blue®

Heavy Duty Cable Lubricant

With Clingability

- » Clean - Easy To Use
- » Stays Slippery - Won't Dry Out
- » Low Cost
- » Temperature Stable - No Waste
- » Safe To Use With Most Cables
- » UL Listed

Dyna-Blue® Cable Lubricant

Dyna-Blue® Lubricant is a clean, slow-drying, and easy-to-apply gel lubricant. It is a thick gel with "clingability" for easy handling and application. Dyna-Blue® combines effectiveness with economy. It is a good lubricant for everyday use in general electrical applications.

Dyna-Blue® Lubricant is harmless to humans, environmentally safe, compatible with most common cable jacket materials, and exceptionally easy to work with. pH neutral and non-toxic.

Dyna-Blue® is UL listed.

Package Size	Dyna-Blue® Product #	Unit/Case
55-gal drum (208 L)	D-Drum	1
5-gal pail (18.9 L)	D-640	1
1-gal pail (3.78 L) 4/case	D-128	4
1-qt squeeze bottle (0.95 L) 12/case	D-35	12

Characteristics

1. Dyna-Blue® shows excellent lubricity on a variety of cable jacket types. Using PVC conduit, the following COF's were measured:
   PVC .11, THHN .09, XHHW .08
   Method described in "Coefficient of Friction Measurement on Polywater's Friction Table, 2007." Typical values determined using 200 lbs/ft normal force.
2. Dyna-Blue® dries slippery. It leaves little residue and will not cement cables to conduit.
3. Dyna-Blue® does not contain wax, grease or silicone.
4. Dyna-Blue® has a wide temperature use range: 20°F to 120°F (-5°C to 50°C).
5. Dyna-Blue® passes IEEE 1210 physical and electrical testing on a wide variety of cable materials. It does not stress crack polyethylene. Refer to the technical bulletin for details.
6. Dyna-Blue® is stable and will not separate after exposure to high heat or freezing.
7. Dyna-Blue® will not stain sheet rock, carpet, concrete or clothing. Wipe up excess product when necessary.
8. Dyna-Blue® has no flash point and dried residue is non-flammable.

To view technical information on our website go to:
Support Page: www.polywater.com/dynablue.html
Lubricant Application Videos: www.polywater.com/videos.asp

American Polywater® Corporation

phone: 1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
email: support@polywater.com
11222 60th St. N, Stillwater, MN 55082, U.S.A

LIT-DFLYER/REV000

Dyna-Blue®
Heavy Duty Cable Lubricant

American Polywater® Corporation

TECHNICAL SPECIFICATION

Description:

Dyna-Blue® Cable Pulling Lubricant is a clean, slow-drying, easy-to-apply gel lubricant. This thick gel lubricant was developed with "clingability" for easy handling and hand application. Dyna-Blue® Lubricant is a good lubricant for everyday use in general electrical and communication applications.

Dyna-Blue® Lubricant is popular for commercial and institutional pulling because it is non-staining and easy to clean up in these environments.

Dyna-Blue® Cable Pulling Lubricant is slow drying. It effectively reduces friction and continues to lubricate for the full length of the pull. Its dried residue is non-conductive and non-combustible.

Dyna-Blue® Cable Pulling Lubricant is harmless to humans, environmentally safe, compatible with cable jacket materials and easy to handle.

Friction Testing:

Lubricity: Dyna-Blue® Lubricant shows good friction reduction across a broad class of jacket types. Typical values 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, 2007" (polywater.com/FTable.pdf). Values are compiled from testing on multiple cable jacket and conduit materials from multiple manufacturers.

	Conduit Type		
Cable Jacket	EMT	PVC	Steel
XLPE	.18	.08	.18
LLDPE	.14	.11	.17
PVC	.11	.11	.19
CPE	.23	.21	.24
THHN	.23	.09	.21

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

Product Benefits:

- Excellent cling for easy hand application
- Clean and non-staining
- Good friction reduction
- Compatible with cable jacket materials
- Temperature stable
- Combines effectiveness with economy

End Use:

Use for all types of cable installations, including:

- General electrical or communication use
- Overhead and vertical installations
- Indoor or building construction
- Heavy cable

Official Approvals:

UL Approved
CSA Listed

Cable Compatibility:

Tensile and Elongation Effects:
XLPE, LLDPE, VLDPE, PVC, CPE, and CSPE cable jacket materials aged in Dyna-Blue® Lubricant per IEEE Standard 1210[1] meet the tensile and elongation retention requirements of that standard.

Polyethylene Stress Cracking:
Dyna-Blue® Lubricant shows no stress cracking on LLDPE, MDPE, or HDPE cable jacket 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 Dyna-Blue® Lubricant as tested by UL requirements[2].

Cable Approvals:
Dyna-Blue® Lubricant is approved by most cable manufacturers. Contact American Polywater for further information.

[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.*

Performance Properties:

Cling Factor:
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 75 grams of Dyna-Blue® Lubricant 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.

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

Combustibility: Lubricant has no flash point and dried residue is non-flammable.

Physical Properties:

Property	Result
Appearance:	Thick, light blue gel
Wax, Grease and Silicone Content:	None
Non-Volatile Solids (%):	3.0%
VOC Content:	0 gms/L
Viscosity:	70,000 – 110,000 cps @10rpm
pH:	6.5 – 8.5

Application Properties:

Application Systems:
Dyna-Blue® Lubricant has a thick gel consistency that makes it easy to hand apply.

Dyna-Blue® Lubricant can also be pumped directly into the conduit or onto the cable using the Polywater® LP-3 or LP-D5 specialty lubricant pumps. Pumps allow hands-free transfer and consistent application of lubricant. However, the thick gel consistency limits the length of the discharge hose and the pumping rate. The LP-3 supports Dyna-Blue® Lubricant application rates up to 0.9 gallon (3.5 liters) per minute and LP-D5 supports Dyna-Blue® Lubricant application rates of 0.1 to 0.3 gallon (0.4 to 1.2 liters) per minute.

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.

Temperature Use Range:
20° F to 120° F (-5° C to 50° C).

Temperature Stability:
No phase-out after five freeze/thaw cycles or 5-day exposure at 120° F (50° C).

Clean-Up:
Dyna-Blue® Lubricant is non-staining. Complete clean-up is possible with water.

Storage and Shelf Life:
Store Dyna-Blue® Lubricant in a tightly sealed container away from direct sunlight. Lubricant shelf life is one year.

Directions for Use:

Dyna-Blue® Lubricant can be squeezed, pumped or hand applied directly onto the wire or cable. The thick clingy gel character allows Dyna-Blue® to be applied to vertical installations. Conduit should be clean and continuous.

To prelubricate for long or difficult pulls, squirt a liberal amount of Dyna-Blue® Lubricant into the conduit before the pull begins and use a mandrel or a swab on the winch line to spread the lubricant during the pull.

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 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 jacket hardness
(Increase quantity for stiff, heavy cable)

Conduit type and conditions
(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 Engineering 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 Dyna-Blue® Lubricant. The cable pulling lubricant shall produce a low coefficient of friction on a wide variety of cable jacket materials. The lubricant shall be UL listed. It shall be easy to handle and adhere well to the cable.

The lubricant shall pass the IEEE 1210, Standard Tests for Determining Compatibility of Cable-Pulling Lubricants with Wire and Cable. It shall pass physical compatibility tests on LLDPE, XLPE, CPE, and PVC cable jacket or sheath materials. 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.

Order Information:

Cat #	Package Description
D-35	1-quart squeeze bottle (0.95 liter)
D128	1-gallon pail (3.78 liter)
D-640	5-gallon pail (18.9 liter)
D-Drum	55-gallon drum (208 liter)

Makers of Polywater® and Dyna-Blue® Cable Lubricants and Pull-Planner™ 3000 Software

American Polywater® Corporation

11222 60th St. N.
Stillwater, MN 55082
U.S.A
1-800-328-9384
1-651-430-2270
fax 1-651-430-3634
www.polywater.com(URL) support@polywater.com(e-mail)

Polywater®

CLR

CLEAR CABLE LUBRICANT

All-purpose lubricant for electrical and datacom applications.
Compatible with most cable jacket materials.

- Clean, Non-staining
- Reduces Friction
- Safe, Non-toxic
- Clings to Cable
- Easier Installation
- Biodegradable
- C-UL Approved

Polywater® CLR Product #	Package Size	Units/Case
CLR-35	1-quart squeeze bottle (.95 liter)	12
CLR-128	1-gallon pail (3.8 liter)	4
CLR-640	5-gallon pail (18.9 liter)	1

To view technical information on our website go to:
Support Page: **www.polywater.com/polyCLR.asp**

American Polywater® Corporation
phone: 1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
email: support@polywater.com
11222 60th St. N., Stillwater, MN 55082, U.S.A

ADHESIVES | CLEANERS | **LUBRICANTS** | SEALANTS WWW.POLYWATER.COM

LIT-CLRFLYER/REV001

Polywater® CLR
Clear Cable Lubricant

American Polywater® Corporation

TECHNICAL SPECIFICATION

Description:

Polywater® CLR Clear Cable Pulling Lubricant is a clear, colorless, clean, slow-drying, easy-to-apply gel lubricant. This thick gel lubricant was developed with "clingability" for easy handling and application. Polywater® CLR Cable Pulling Lubricant is a good lubricant for everyday cable pulling of both electrical and communication cable.

Polywater® CLR Clear Cable Pulling Lubricant is popular for small cable installation in a commercial environment because it is non-staining and easy to clean up.

The dried residue of Polywater® CLR is non-conductive and non-combustible. Polywater® CLR Lubricant is harmless to humans, environmentally safe, compatible with cable jacket materials and easy to use.

Friction Testing:

Lubricity: Polywater® CLR Lubricant effectively reduces friction across a broad variety common of jacket types. Typical friction coefficients at 200 lbs/ft (2.91 kN/m) normal pressure are shown below. Test results are based on the method described in the white paper, "Coefficient of Friction Measurement on Polywater's Friction Table, 2007" (polywater.com/FTable.pdf). Values are compiled from testing on multiple cable jacket and conduit materials from multiple manufacturers.

	Conduit Type		
Cable Jacket	**EMT**	**PVC**	**Steel**
XLPE	.14	.11	.13
PVC	.11	.11	.13

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

Product Benefits:

- Excellent cling for easy hand application
- Clear and colorless
- Clean and non-staining
- Good friction reduction
- Compatible with cable jacket materials
- Biodegradable
- Environmentally safe
- Non-toxic
- Temperature stable

End Use:

Suitable for all types of cable installations, including:

- General electrical and datacom installation
- Smaller wiring in upgrades
- Indoor construction

Official Approvals:

UL and C-UL Approved

Cable Compatibility:

Polyethylene Stress Cracking:
Polywater® CLR shows no stress cracking on LLDPE cable jacket when tested per IEEE Standard 1210[1].

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

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® CLR Lubricant as tested by UL requirements[2].

Corrosivity:
Lubricant is non-corrosive to steel, copper, or aluminum. Passes UL 267[2] corrosion testing on zinc-coated EMT.

[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:	Clear, colorless gel
Wax, Grease and Silicone Content:	None
Percent Non-Volatile Solids:	5%
VOC Content:	20 gms/liter
Viscosity:	40,000 – 60,000 cps @10rpm
pH:	6.5 – 8.0

Performance Properties

Cling Factor:
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 70 grams of Polywater® Lubricant CLR 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.

Material will wet out evenly on all surfaces. It will not bead up or rub off of the cable jacket. A one-inch (25 mm) diameter XLPE cable dipped six inches (152 mm) into the Polywater® Lubricant CLR, then withdrawn and held vertically, will retain at least 20 grams of Polywater® Lubricant CLR for one minute at 70° F (21° C).

Residue:
Residue is the percent solids remaining when the lubricant dries. A high residue can "cement" cables in place to prevent future removal or adjustment.

Polywater® CLR Lubricant has a low residue, less than 5% solids. The residue dries clear with no powders or discoloration. As Lubricant CLR dries, the product retains its lubricity.

Combustibility:
Lubricant has no flash point and dried residue is non-flammable.

Clarity:
Polywater® CLR Lubricant is completely clear and non-staining. All components are water soluble.

Application Properties:

Application Systems:
Polywater® CLR has a thick gel consistency that makes it easy to hand apply. The product will cling to the cable through vertical and long pulls.

The clear character of the lubricant and the low solids content make Polywater® CLR an ideal lube for installations where cleanliness is a concern.

Pull-Planner™ Cable 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.

Temperature Use Range:
20° F to 120° F (-5° C to 50° C).

Temperature Stability:
No phase-out after five freeze/thaw cycles or 5-day exposure at 140° F (60° C).

Clean-Up:
Polywater® CLR is non-staining. Complete clean-up is possible with water.

Storage and Shelf Life:
Store Polywater® CLR in a tightly sealed container away from direct sunlight. Lubricant shelf life is one year.

Directions for Use:

Polywater® CLR Lubricant can be squeezed, pumped or hand applied directly onto the wire or cable. The conduit should be clean and continuous.

To prelubricate for long or difficult pulls, squirt a liberal amount of Polywater® CLR Lubricant into the conduit before the pull begins and use a mandrel or a swab on the winch line to spread the lubricant during the pull.

Clean-up by wiping off 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® CLR Lubricant. The lubricant shall be a clear, colorless thick gel that can be hand applied without dripping. The lubricant shall contain **no** waxes, greases, or silicones.

Cable jacket compatibility shall be tested by the IEEE 1210, Standard Tests for Determining Compatibility of Cable-Pulling Lubricants with Wire and Cable. It shall pass physical compatibility tests on PVC, LLDPE and XLPE cable jacket or sheath materials. It shall not stress crack polyethylene per ASTM Standard 1693. There shall be no significant changes in the conductive properties of XLPE semi-conducting compounds when the lubricant's effect on volume resistivity is tested according to IEEE Standard 1210.

Order Information:

Cat #	Package Description
CLR-35	1-quart squeeze bottle (0.95 Liter)
CLR-128	1-gallon pail (3.78 Liter)
CLR-640	5-gallon pail (18.9 Liter)

Lit-CLRTech/REV000

Makers of Polywater® and Dyna-Blue® Cable Lubricants and Pull-Planner™ 3000 Software

American Polywater® Corporation

11222 60TH St. N
Stillwater, MN 55082
U.S.A
1-800-328-9384
1-651-430-2270
fax 1-612-430-3634
www.polywater.com(URL) support@polywater.com(e-mail)

CableFree®

Loosener

A Revolutionary Cable Removal Aid

- **LOOSENS** stuck cables by softening binding agents such as wax, rust, soap, dirt, bitumen.
- **LUBRICATES** to minimize the force required to pull the cable out once it has broken free.
- **LEAVES** empty conduit undamaged and ready for reuse after cleaning and drying.
- **LOWERS** duct reclamation costs by eliminating expensive cut-ins.

CableFree® Loosener is designed to loosen and remove cables that are held in conduits by wax, rust, dirt, soap, or other adhesive residues. CableFree® Loosener will dissolve a great variety of binding agents. However, because of the large variety of causes of "stuck" cable, 100% success cannot be guaranteed.

The money saved by a successful removal of stuck cable(s) can be very high. Even a partial success rate can make the investment of time and effort worthwhile. The end-user must make this determination, however, based on the potential economic alternatives to any particular cable removal.

Limitations: The use of CableFree® Loosener is not intended to allow re-use of the cable being removed. The cable(s) being removed may be ruined by the solvent nature of the product and the high pulling forces required for removal.

Also, the removal of a single cable from a group of cables is usually not possible. All the cables in a conduit should be removed in bulk, and new cables installed.

ORDERING INFORMATION

Quantity: As a rule of thumb, one quart of CableFree® Loosener should be used for every 50 feet of 1" conduit (1 liter per 15 m of 2.5 cm conduit). For larger conduits, the following equation provides a starting estimate of the amount of Loosener for a particular cable removal.

Q=.02 x L x D
Metric Formula: Q = .024 x L x D

Q = quantity required in quarts *(liters for metric)*
L = length of the conduit in feet *(meters for metric)*
D = diameter of the conduit in inches *(centimeters for metric)*

Package Size	CableFree® Product #	Units/Case
5-gallon pail (18.9 liters)	CF-640	1
1-gallon jug (3.78 liters)	CF-128	4
1-quart bottle (0.95 liters)	CF-35	12

Use Procedure

Preparation

1. All circuits should be de-energized for safe operation. Do not work with liquid chemicals around live circuits. Critical switch gear, etc., should be covered and protected from spillage and drippage.

2. NOTE: Caution should be exercised when working with these liquid materials. Wear protective goggles and gloves at all times. Consult the material safety data sheets for more complete details.

Application

3. Fish a tape through the conduit system, if possible. Attach a sponge or a rag to the tape, sized to fit snugly in the conduit. If the conduit cannot be fished, see step 5.

4. Pour, pump, or squirt the appropriate quantity of CableFree® Loosener into the higher end of the conduit system. Spread the Loosener throughout the conduit by pulling the sponge or rag back and forth with the tape(s).

5. Another practical way to spread the Loosener is to use air pressure to “blow” it through the system. If only small amounts of CableFree® Loosener can be loaded at one time, alternate air blasts with doses of Loosener. For long segments, the Loosener can be blown in from both ends of the conduit.

6. The objective is to get the CableFree® Loosener to all points of the conduit so it can dissolve the binding materials. This may take several swab bull-throughs or air blasts, as well as some persistence.

7. If there are pull-through boxes with access, treat each segment separately, performing the procedure for each segment.

8. Place the cable puller, if required, at the optimal pulling location. For easier removal, the cable should be pulled out at the lower end of a vertical conduit system. It is also best to have any bends in the system as far away from the puller as possible. Attach a hydraulically crimped pulling eye or other strong fastening method to the cable conductors. Pull on the conductors (metal) to take advantage of their strength.

Removal

9. Once the CableFree® Loosener has been spread through the conduit, allow it to sit in the system as long as possible (for at least 2 but preferably 24 hours). The older the system, the longer the time required. For long waiting times or hot conduit systems, the conduit ends should be plugged with a rag to trap vapors inside. After waiting, attempt to free the cables by pulling on them. Twisting the cables in one direction can help break them free. Also, pulling on individual cables and breaking them free one at a time sometimes works.

10. If the cables fail to move, attach a hydraulic jack or try pulling from the opposite end. Raise and maintain high tension on the cables. Try pulling again after a 20-to-30 minute waiting period under tension. Increase tension and repeat steps, if necessary. Introduce “vibration” by hitting the tight cables with a pipe or bat. Such vibration can help break the cables free.

11. If the cable is still stuck, cut the conduit somewhere where it’s accessible and try pulling the cables out from the middle. Repeat the loosening process with additional CableFree® Loosener, if necessary. Keep trying the procedures above until you break the cable free.

Clean-up

12. Once the cable is removed, pull a water-soaked rag through the conduit, then pull a drying swab back and forth until the conduit is dry. Blow air through the conduit until no CableFree® Loosener odor remains.

To view technical information on our website go to:
Support Page: **www.polywater.com/cablfree.html**
Application Videos: **www.polywater.com/videos.asp**

American Polywater® Corporation

phone: 1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
email: support@polywater.com
11222 60th St. N, Stillwater, MN 55082, U.S.A

Polywater®

CPL Pourable Lubricant

Universal Pulling Lubricant for Fiber Optic, Copper, Coax, and Power Supply Cables

- Superior friction reduction! -

Also Available in

WINTERGRADE

(Non-Freezing) Formula

- **Pourable lubricant for easy underground application**
- **Compatible with all cable jackets, including polyethylene**
- **Effective lubrication when dry**
- **Lubricates cable for long distance- liquid clings to cable**

Polywater® Cable Lubricant CPL

Polywater® Lubricant CPL is a universal high performance, pourable cable pulling lubricant formulated specifically for the communications industry. It is recommended for long fiber optic, copper, coaxial, or power supply cable pulls.

Polywater® Lubricant CPL provides maximum friction reduction between cable and conduit under both low and high sidewall bearing pres sures. It is slow-drying and leaves a lubricating film after its water base has evaporated. Polywater® CPL is a stringy, silicone-enhanced lubricant that clings to cable throughout a pull. This cling maximizes surface area lubrication, thus increasing the efficiency of the cable pull.

Cat. No.	Pack. Size	Case Qty
CPL-128	1-gal (3.8 liter) jug	4
CPL-320	2.5-gal (9.5 liter) jug	2
CPL-640	5-gal (18.9 liter) pail	1

Winter Grade Cat. No.	Pack. Size	Case Qty
WCPL-35	1-quart (0.95 liter) bottle	12
WCPL-128	1-gal (3.8 liter) jug	4
WCPL-320	2.5-gal (9.5 liter) jug	2
WCPL-640	5-gal (18.9 liter) pail	1

Polywater® Lubricant CPL meets California Environmental Regulation CCR 22-Flathead minnow hazardous waste bioassay. Polywater® CPL is suitable for use on PE communication cable jackets.

SPECIFICATIONS

1. **Lubricity:** LDPE-, MDPE- and HDPE jacketed cable on HDPE and PVC innerduct at 200 lbs./ft. (2.91 kN/m) sidewall force, coefficient of kinetic friction < 0.12
2. **Percent non-volatile solids:** 4.5% to 5.5%
3. **Appearance:** Opaque-white stringy liquid. Pourable viscosity (1,000-3,000 cps@10rpm)
4. **Temperature use range:** 20°F to 120°F (-5°C to 50°C) for Polywater® CPL, -20°F to 120°F (-30°C to 50°C) for Polywater® CPL.
5. **pH:** Neutral (6.5-7.5).
6. **Cable compatibility:** No deleterious effects on physical or electrical properties of cable jackets.
7. **Polyethylene stress cracking:** No stress cracking on LDPE cable jackets when tested by ASTM D1693.
8. **Temperature stability:** No more than a 20% change in Brookfield viscosity from 40°F to 100°F (5°C to 40°C). No phase-out after five freeze/thaw cycles or 5-day exposure at 120°F (50°C).
9. **Toxicity:** Non-toxic and non-sensitizing. Industrial use only.
10. **Flammability:** Lubricant has no flash point and dried residue is not combustible.
11. **Clean-up:** Complete clean-up possible with water.

To view technical information on our website go to:

General Cable Lubricant information: www.polywater.com/lubeinfo.asp
Installing Communication Cable in Conduit: www.polywater.com/commcabl.html
Duct Factor in F/O Pulling: www.polywater.com/ductdisp.html

American Polywater® Corporation

phone: 1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
email: support@polywater.com
11222 60th Street North, Stillwater, MN 55082, U.S.A.

ADHESIVES | CLEANERS | **LUBRICANTS** | SEALANTS WWW.POLYWATER.COM

LIT-CPLFLYER/REV000

Polywater® FTTx Communications Lubricant

American Polywater® Corporation

TECHNICAL SPECIFICATION

Description:

Polywater® FTTx Lubricant is a high performance, liquid cable pulling lubricant designed specifically for communication cable installations. Lubricant FTTx is highly concentrated and works with only a thin coating. It can be sprayed or wiped for easy application, or poured into innerduct for long pulls. It has excellent cling and wetting, evenly coating the entire cable jacket surface. Lubricant FTTx works even after it has dried. The residue is a thin, slippery film that retains lubricity for months after use.

Polywater® FTTx Lubricant is recommended for quick and easy lubrication with no mess. The lubricant is suitable for all types of communication cable installations.

Friction Testing:

Friction is determined using a standard Telcordia test procedure[1]. The duct is wrapped 420° around a three-foot-diameter cylinder. A variable incoming weight is attached to the cable as it is pulled at a set rate of 65 feet per minute. A load cell takes pulling tension data which is used to determine a "dynamic" friction coefficient.

Coefficient of Friction for MDPE-Jacketed Cable on HDPE Continuous Innerduct

Back Tension	Wipe Application	Spray Application
8 lb_f	.09	.09
25 lb_f	.08	.07

[1] Telcordia Standard TR-NWT-002811, Section 4.1.3 and 4.1.4; Generic Requirements for Cable Placing Lubricants.

Product Benefits:

- Easy spray or wipe application
- Lubricates with a thin film
- Excellent friction reduction
- Performs after drying
- Compatible with cable jackets
- Clean and non-staining

End Use:

- Fiber optic drops (FTTx)
- High performance data cable
- Textile innerduct
- Long fiber pulls
- Long copper pulls

Performance Properties

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

Polywater® FTTx Lubricant will wet out evenly on all surfaces. It will not bead up or rub off of the cable jacket. Lubricant will completely coat a one-inch diameter PVC-jacketed cable dipped six inches into the lubricant; then withdrawn within 10 seconds. The lubricant coating shall cover 100% of the cable jacket without dripping off or pulling away from the edges as it is held horizontally for one minute (at 70°F).

Combustibility:
Lubricant has no flash point and dried residue is non-flammable.

Sprayability:
Low viscosity lubricant allows product to flow through spray head. Lubricant will not clog valves or atomizers.

Physical Properties:

Property	Result
Appearance:	Slightly thickened, white liquid
Percent Non-Volatile Solids:	3 %
VOC Content:	0 gms/liter
Viscosity:	250 – 750 cps @10rpm
pH:	6.5 – 8.0

Application Properties:

Temperature Use Range:
20°F to 120°F (-5°C to 50°C).

Temperature Stability:
No phase-out after five freeze/thaw cycles or 5-day exposure at 120°F (50°C). *Will not phase out or separate during the shelf life of lubricant.*

Clean-Up:
Non-staining. Complete clean-up with water.

Storage and Shelf Life:
Store tightly sealed, away from direct sunlight. Lubricant shelf life is one year past the date of manufacture.

Cable Compatibility:

Polyethylene Stress Cracking:
Polywater® FTTx does not cause environmental stress cracking of polyethylene jackets commonly found on communications cables. Untreated polyethylene (Union Carbide DYNK) and MDPE jacket material were both tested according to ASTM standard method.[1] After 168 hours exposure none of the test specimens showed failures.

Polycarbonate Stress Cracking:
Polywater® FTTx will not stress crack polycarbonate. Polycarbonate bars are bent to a defined strain and exposed to lubricant as described in the Telcordia standard[2], Section 8.2, Stress Cracking of Polycarbonate. After 48 hours, none of the test specimens showed signs of crazing or cracking.

Corrosion of Copper and Steel:
Polywater® FTTx will not corrode copper after 24-hour exposure as described in the Telcodia standard[2], Section 8.3, Copper Mirror Test.

[1] *ASTM Test Method D1693, Environmental Stress-Cracking of Ethylene Plastics.*

[2] *Telcordia Standard TR-NWT-002811; Generic Requirements for Cable Placing Lubricants.*

Directions for Use:

Polywater® FTTx Lubricant can be sprayed or wiped directly onto the cable as it enters the conduit. It may also be poured directly into duct.

For normal cable pulls, prelube the conduit by spraying five to ten squirts of pulling lubricant into the conduit before pulling. Saturate a wipe by spraying with lubricant and lightly wipe lubricant on jacket to fully coat the cable as it enters the conduit.

For lowest coefficient of friction, completely prelubricate the conduit. Squirt or pour appropriate amount of lubricant into the conduit and pull through a sponge or lubricant spreader to coat the interior of the entire length. Wipe lubricant on cables as they enter the conduit as described in above.

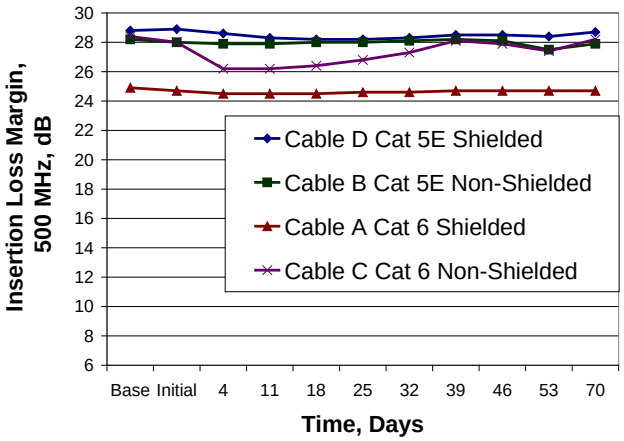
High efficiency spray pulling lubricants are effective with very thin coats in the range of 1 to 5 mg/cm^2 of jacket surface. See product usage section for lubricant quantity formulas.

Product Usage and Application Systems:

Polywater® FTTx Lubricant is innovative. It is intended for flexibility and ease in use. It is a very thin liquid that can be sprayed or wiped directly onto the cable jacket. Polywater® FTTx can be used to facilitate cable pushing for shorter installations. It can be poured or sprayed into conduit for longer, outside plant installations.

High Performance Data Cables:
Polywater® FTTx is recommended for high performance data cables. It has a minimal effect on the data carrying capacity of high speed, Cat. 5E, 6 and 6A copper cable. As a "thin-film" lubricant, FTTx has a limited effect on cable signal attenuation.

Data Cables in 100 ft., Closed Conduit



Polywater® FTTx shows dramatic friction reduction in data cable installations. Data cable pulled through EMT conduit with two 90° bends and a back tension of 14 lbs.

Coefficient of Friction
Data Cable in EMT Conduit

Unlubricated	.33
Polywater® FTTx	.10

Polywater® FTTx reduces friction by 70%.

For more information and full test results, please see *TIA Paper TR42.7, PN SP-3-0177, "The Effect of Lubricants on High Frequency Data Cables."*

The lubricant may be sprayed on a towel or an FTTx-D20 wipe can be used to efficiently apply the lubricant to the cable jacket. The pre-saturated wipe lays down a thin, even coat of lubricant. The towel material is specifically formulated to release lubricant without mess.

Wipe Application

Quantity Formula for High Performance Data Cables

Q = 4 X n X D

Where:
Q = Quantity lubricant, fluid ounces per 100 ft
n = Number of cables in conduit
D = Average cable diameter in inches

Approximate quantity will vary by complexity of pull and field conditions.

Cable Pushing and Fiber Drops:
Polywater® FTTx Lubricant eases short installations of fiber where the fiber is pushed up to 300 feet. It effectively lowers friction so that the cable can be pushed farther distances, eliminating the need to blow or rod in pulling tapes.

The FTTx-35LR comes with an easy application trigger sprayer. The trigger head is industrial-quality, high volume. Use this package to apply FTTx Lubricant directly to the cable or to inject into conduit.

Spraying Action

Note: A high-volume trigger sprayer injects one fluid ounce per 20 sprays.

Product Usage and Application Systems:

Textile Innerduct:
Proven to reduce friction on these specialty fabrics, Polywater® FTTx Lubricant is perfect for use with textile innerducts. FTTx is directly applied to cable, dramatically lowering friction.

Friction is determined using a modification of Telcordia test procedure[1]. In this test, a fabric inner duct is placed inside a continuous HDPE conduit. The MDPE-jacketed cable is lubricated with Polywater® FTTx and pulled through a fabric cell.

Coefficient of Friction in MaxCell™ Fabric Innerduct

Back Tension	Polywater® FTTx Wipe
25 lb_f	.08

[1] Telcordia Standard TR-NWT-002811, Section 4.1.3 and 4.1.4; Generic Requirements for Cable Placing Lubricants.

MaxCell is a trademark of The MaxCell Group, Wadsworth, OH

Polywater® FTTx doesn't leak or squeeze into neighboring cells, causing them to seal shut. Use of a "thin-film" lubricant such as FTTx is ideal for this end use.

Prelubricated Duct:
Polywater® FTTx Lubricant is compatible with prelubricated duct.

Traditional Outside Plant Cable Installation:
For traditional cable installations, Polywater® FTTx Lubricant can be pumped, poured or sprayed into the innerduct.

Quantity Formula for Fiber Cable Installation

Q = K X L X D

Where: Q = Quantity of lubricant gallons (liters)
L = Length of conduit in feet (meters)
D = Cable diameter in inches (mm)
K = .00038 (.0002 if metric)

Appropriate quantity for use on any given pull can vary from this recommendation by 50%, depending on complexity. Adjust the volume of pulling lubricant based on cable stiffness, conduit type and condition, conduit fill, and pulling environment.

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® Lubricant FTTx. Lubricant has a low viscosity that may be sprayed without clogging valves or applicators. It shall coat and cling to the cable. It shall be non-staining. Lubricant shall produce a low coefficient of friction on communication cable jacket materials and shall lubricate at low coating thickness. Lubricant shall continue to reduce friction after it has dried. It shall conform to the physical and performance requirements of Telcordia Standard, TR-NWT-002811, Generic Requirements for Cable Placing Lubricants. It shall have a limited effect on data cable signal attenuation. It shall not contain solvents and shall not have a flash point.

No substitutions are permitted without certification from an officer of the manufacturer that the substitute product meets all of the requirements of this specification

Order Information:

Cat #	Package Description
FTTx-D20	20-ct wipe canister 12/case
FTTx-35LR	1-quart spray bottle (.95 Liter) 12/case
FTTx-128	1-gallon pail (3.78 Liter) 4/case
FTTx-640	5-gallon pail (18.9 Liter)
FTTx-35 *(Special Order)*	1-quart bottle (.95 Liter) 12/case

American Polywater® Corporation
11222 60th St N
Stillwater, MN 55082
U.S.A
1-800-328-9384
1-651-430-2270
fax 1-651-430-3634
http://www.polywater.com (URL) support@polywater.com (e-mail)

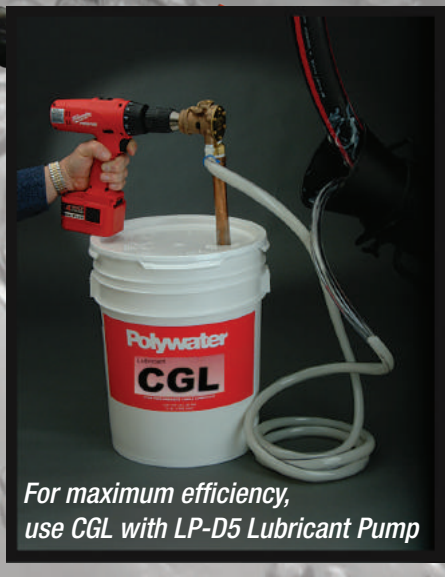
Polywater® CGL Gel Lubricant

Universal Pulling Lubricant for Copper, Coax, Fiber Optic and Power Supply Cables

UL® LISTED

*Also Available in
WINTERGRADE
(Non-Freezing) Formula

- **Superior friction reduction**
- **Clings to cable for long distance pulls**
- **Clean and non-staining**
- **Compatible with PE and low-smoke zero-halogen (LSZH) communication cable jackets**



For maximum efficiency, use CGL with LP-D5 Lubricant Pump

Polywater® Cable Lubricant CGL

Polywater® Lubricant CGL is high performance, gel cable pulling lubricant formulated specifically for the communications industry. It is recommended for fiber optic, copper or coaxial cable pulls.

Polywater® Lubricant CGL provides maximum friction reduction between cable and conduit under both low and high sidewall bearing pressures. It is slow-drying and leaves a lubricating film after its water base has evaporated. Polywater® CGL is a gel material that can be applied by hand or Polywater's LP Pumps.

Cat. No. / Winter Grade	Pack. Size	Case Qty
CGL-35/WCGL-35	1-qt (0.95 liter) bottle	12
CGL-128/WCGL-128	1-gal (3.8 liter) pail	4
CGL-640/WCGL-640	5-gal (19 liter) pail	1
CGL-27	1-qt (0.95 liter) bag	12
CGL-99	1-qt (0.95 liter) bag	16
CGL-55	1/2-gal (1.9 liter) bag	6
CGL-110	1/2-gal (1.9 liter) bag	10

Polywater® Lubricant CGL is suitable for use on PE and low-smoke zero-halogen (LSZH) communication cable jackets.

Polywater® Lubricant CGL is safe in the aquatic environment and passes CCR Title 22 Fathead Minnow Hazardous Waste Screen Bioassay.

Characteristics

1. Polywater® CGL shows excellent lubricity on a variety of cable jacket types. The following COF's were measured using

   Rigid Steel conduit:
   LSZH .15, CPE .13, CSPE .21, LLDPE .10;
   FRP conduit:
   LSZH .17, CPE .17, CSPE .24, LLDPE .11;
   PVC conduit:
   LSZH .07, CPE .10, CSPE .16, LLDPE .05;

   Method described in "Coefficient of Friction Measurement on Polywater's Friction Table, 2007." Typical values determined using 200 lbs/ft normal force.
2. Polywater® CGL dries slippery. It leaves little residue and won't cement cables into conduit.
3. Polywater® CGL does not contain wax or grease.
4. Polywater® CGL has a wide temperature use range: Polywater® CGL, 20°F to 120°F (-5°C to 50°C) Winter grade Polywater® WCGL, -20°F to 120°F (-30°C to 50°C)
5. Polywater® CGL passes IEEE 1210 physical and electrical testing on a wide variety of cable materials. It does not stress crack polyethylene. Refer to the technical bulletin for details.
6. Polywater® CGL is stable and will not separate after exposure to high heat or freezing.
7. Polywater® CGL will not stain sheet rock, carpet, concrete or clothing. Wipe up excess product when necessary.
8. Polywater® CGL has no flash point and dried residue will not support or spread flame. Test supported by a modified version of IEEE 383, vertical flame tray test.

To view technical information on our website go to:
General Cable Lubricant information: www.polywater.com/lubeinfo.asp
Installing Communication Cable in Conduit: www.polywater.com/commcabl.html
Duct Factor in F/O Pulling: www.polywater.com/ductdisp.html

American Polywater® Corporation
phone: 1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
email: support@polywater.com
11222 60th Street North, Stillwater, MN 55082, U.S.A.

LIT-CGLFLYER/REV001

Polywater® Communication Gel Lubricant Type CGL

POLYWATER® Lubricant CGL is a high performance, **gel** cable pulling lubricant formulated specifically for the communications industry. It is recommended for fiber optic, copper or coaxial cable pulls.

POLYWATER® Lubricant CGL provides maximum friction reduction between cable and conduit under both low and high sidewall bearing pressures. It is slow-drying and leaves a lubricating film after its water base has evaporated. Polywater® CGL is a gel material and can be applied by hand or using Polywater's LP Pumps.

POLYWATER® Lubricant CGL meets California regulation CCR 22. Polywater® CGL is suitable for use on PE and low-smoke zero-halogen (LSZH) communication cable jackets.

Product Benefits

- Superior friction reduction
- Effective lubrication when dry
- High cling factor
- Compatible with cable jackets—including fire-rated, plenum
- Clean and non-staining

Friction Testing

Friction is measured using the method described in the white paper, "Coefficient of Friction Measurement on Polywater's Friction Table, 2007" (polywater.com/FTable.pdf). Values are averages based on cable jacket and conduit materials from multiple manufacturers. Typical friction coefficients at 200 lbs/ft (2.91 kN/m) normal pressure are shown.

Coefficient of Friction for POLYETHYLENE Jacket Cable

Conduit Type	Typical Value
HDPE	.04
PVC	.05

Environmental Testing

POLYWATER® Lubricant CGL is safe in the aquatic environment and passes CCR Title 22 Fathead Minnow Hazardous Waste Screen Bioassay.

Product	Result
POLYWATER® Lubricant CGL:	PASS (LC_{50} > 750 mg/L)

Compatibility

Polyethylene Stress Cracking:
POLYWATER® Lubricant CGL does not stress crack polyethylene jackets commonly used on communications cables. MDPE and HDPE jacket materials were tested according to ASTM standard method[2]. After 168 hours exposure none of the test specimens showed failures.

[2] ASTM Test Method D1693, Environmental Stress-Cracking of Ethylene Plastics.

Properties

Appearance:
Opaque-white stringy gel. Light gel viscosity (35,000 -50,000 cps @ 10rpm). Neutral pH (6.5 – 7.5).

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

Combustibility:
Lubricant has no flash point and dried residue is non-flammable.

Temperature Use Range:

Communication Gel Lubricant CGL:	Wintergrade Lubricant, WCGL
20°F to 120°F (-5°C to 50°C)	-20°F to 120°F (-30°C to 50°C)

Temperature Stability:
No phase-out after five freeze/thaw cycles or 5-day exposure at 120°F (50°C). *Will not phase out or separate during the shelf life of lubricant.*

Clean-Up:
Non-staining. Complete clean-up with water.

Storage and Shelf Life:
Store tightly sealed, away from direct sunlight. Lubricant shelf life is one year past the date of manufacture.

Order Information

Cat #	Package Description
CGL-27	1-quart bag (0.95 liter)
CGL-35	1-quart squeeze bottle (0.95 liter)
CGL-55	½-gallon bag (1.9 liter)
CGL-128	1-gallon pail (3.78 Liter) 4/case
CGL-640	5-gallon pail (18.9 Liter)
	Wintergrade
WCGL-128	1-gallon pail (3.78 Liter) 4/case

phone: 1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
email: support@polywater.com
11222 60th St N, Stillwater, MN 55082, U.S.A

Polywater® F Communications Lubricant

American Polywater® Corporation

TECHNICAL SPECIFICATION

Description:

Polywater® F Lubricant is a high performance, pourable liquid, cable pulling lubricant recommended for pulling underground fiber optic cable. Polywater® F is also suitable for pulling coaxial and copper-pair cable.

Polywater® F wets and clings to cable jacket and evenly coats the jacket surface. It continues to lubricate by leaving a lubricating film after its water base has evaporated. Lubricant F is compatible with a broad range of cable jackets, including polyethylene types.

Polywater® F is a thick liquid, and is applied by pouring or pumping the lubricant into the duct system. F is a popular lubricant and used in the pulling over 50,000 miles (80,000 km) of fiber optic cable into duct.

Friction Testing:

Friction is measured using a standard Telcordia test procedure[1]. HDPE duct is wrapped 420° around a three-foot-diameter (0.91 m) cylinder. A weight is attached to the back of the test cable (variable back tension). Pulling force is measured as the cable is pulled at 65 ft/min (19.8 m/min) through the wrapped duct. A friction coefficient is calculated from the pulling force/back tension ratio. Results below are typical values.

Coefficient of Friction for Communication Cable into HDPE Smoothwall Innerduct

Back Tension	Cable Jacket		
	MDPE	HDPE	PVDF
8 lb_f	.10	.12	.10
14 lb_f	.10	.12	.09
25 lb_f	.10	.11	.09

Polywater® F Lubricant shows good friction reduction for these common cable jackets at both high and low bend shear.

[1] *Telcordia Standard TR-NWT-002811, Section 4.1.3 and 4.1.4; Generic Requirements for Cable Placing Lubricants.*

Product Benefits:

- Field proven performance
- Easy to pour into innerducts and feeder tubes
- Approved and recommended by many cable manufacturers
- Superior friction reduction
- Carries with cable for long distance - wets and clings to cable.
- Compatible with cable jackets
- Clean and non-staining

End Use:

Use for all types of cable installations, including:

- Outside plant cable pulls
- Underground cable installation
- Lightweight cable, long-haul installation

Performance Properties

For fiber pulling, special pulling lubricants are required for the long lengths and significant duration of the pulls. Lightweight fiber cable can rub on both the top and bottom of the duct, so the lubricant must completely coat the cable jacket and stay evenly coated. The lubricant must remain slippery over time, and not dry to a hard or sticky residue.

Wetting – Continuous Coat:
Wetting is a measure of the lubricant's ability to coat the jacket for continued lubricity on longer pulls.

Polywater® F Lubricant will wet and coat evenly on jacket surfaces. A half-inch (13 mm) diameter PE-jacketed cable shall be dipped six inches (152 mm) into Polywater® F Lubricant for 10 seconds and then removed. The lubricant coating shall cover 100% of the cable jacket without dripping off, beading up, or pulling away from the edges as the cable is held horizontally for one minute at 70° F (21° C).

Stringy Rheology:
"String" character is a measure of the lubricant's pituity and its ability to adhere, follow and stay with cable over long distances.

A ¼-inch (6 mm) fiber cable (MDPE jacket) dipped two inches (50 mm) into Polywater® F Lubricant and then pulled out at a 40 inches/minute rate (100 cm/min) will produce a non-supported, lubricant string length greater than 8 inches (20 cm) .

Pourability:
Pourability is a measure of the lubricant's ease of pouring.

Five gallons (18.9 l) of Polywater® F Lubricant will empty from a Reike® spouted 5-gallon pail in less than 90 seconds (no air relief) and in less than 60 seconds with air relief.

Combustibility:
Polywater® F Lubricant has no flash point and its dried residue is not flammable.

Physical Properties:

Property	Result
Appearance:	Orange-colored, stringy liquid
Percent Non-Volatile Solids:	< 5 %
VOC Content:	60 gms/liter 260 gms/liter (wintergrade)
Viscosity:	1,000 – 3,000 cps @10rpm
pH:	8.0 – 9.5

Application Properties:

Temperature Use Range:
Polywater® F:
20° F to 140° F (-5° C to 60° C).
Polywater® WF (wintergrade version):
-20°F to 140°F (-30° C to 60° C).

Temperature Stability:
Polywater® F will not show more than a 20% change in Brookfield viscosity from 40° F to 100° F (5° C to 40° C). Polywater® F will not phase-out after five freeze/thaw cycles or 5-day exposure at 120° F (50° C). Polywater® F will not phase out or separate over the shelf life of the lubricant.

Clean-Up:
Polywater® F is non-staining. Complete clean-up is possible with water.

Storage and Shelf Life:
Store Polywater® F in a tightly sealed container away from direct sunlight. Lubricant shelf life is one year.

Cable Compatibility:

Polyethylene Stress Cracking:
Polywater® F does not cause stress cracking of polyethylene jackets commonly used on communications cables.

Cable jacket polyethylene blends were tested according to ASTM ESCR standard method.[1]

DFDA 0588 Low density polyethylene
DFDA 6049 Linear low density polyethylene
DHDA 6497 Medium density polyethylene
DGDJ 3479 High density polyethylene
MDPE Stripped Cable Jacket

After 500 hours immersion in Polywater® F none of the specimens showed failures.

Polycarbonate Stress Cracking:
Polywater® F does not stress crack polycarbonate. Polycarbonate bars were bent to a defined stress and exposed to Polywater® F lubricant as described in the Telcordia standard[2], Section 8.2, Stress Cracking of Polycarbonate". After 48 hours, none of the test specimens showed crazing or cracking.

[1] ASTM Test Method D1693, Environmental Stress-Cracking of Ethylene Plastics.
[2] Telcordia Standard TR-NWT-002811; Generic Requirements for Cable Placing Lubricants.

Directions for Use:

Polywater® F can be poured or pumped directly into the conduit before and during the pull. Coat the entire cable as it enters the conduit.

Polywater® F can be pumped with the Polywater® LP-D5 specialty lubricant pump. Pumping allows hands-free transfer and consistent application of lubricant.

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

Recommended Lubricant Quantity

Q = k X L X 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® Lubricant F. The lubricant shall contain no waxes, greases, silicones, or waxes.

The lubricant shall be a pourable liquid with good wetting (coating) properties. It shall have a friction coefficient less than 0.15 using MDPE-jacketed cable and HDPE innerduct.

The lubricant shall conform to the physical and performance requirements of Telcordia Standard, TR-NWT-002811, "Generic Requirements for Cable Placing Lubricants". It shall not stress crack polyethylene when tested by ASTM 1693. .

No substitutions are permitted without certification from an officer of the manufacturer that the substitute product meets all of the requirements of this specification

Order Information:

Cat #	Package Description
	Regular
F-35	1-quart squeeze bottle (0.95 liter)
F-128	1-gallon jug (3.78 liter)
F-320	2 ½- gallon jug (9.5 liter)
F-640	5-gallon pail (18.9 liter)
	Wintergrade
WF-35	1-quart squeeze bottle (0.95 liter)
WF-128	1-gallon jug (3.78 liter)
WF-320	2 ½- gallon jug (9.5 liter)
WF-640	5-gallon pail (18.9 liter)

American Polywater® Corporation
11222 60th St. N.
Stillwater, MN 55082
U.S.A
1-800-328-9384
1-651-430-2270
fax 1-651-430-3634
http://www.polywater.com(URL) support@polywater.com(e-mail)

Polywater®

Prelube

Cable Blowing Lubricants for Air-Assisted Installation of Fiber Cable

Lower Friction and Increase Blowing Distance

Prelube 2000™

for blowing conventional fiber optic cable

Easy to Apply

Low Overall Cost

Proven, Effective Formula

Prelube 5000™

for blowing fiber optic microcables

Thinner Viscosity

Field Developed & Tested

New, More Concentrated Formula

Polywater®

Prelube

2 0 0 0™

for blowing conventional fiber optic cable

Polywater® Prelube 2000™ reduces frictional drag during the blowing of outside plant cable into duct. It increases the length of cable that can be blown in a single shot. Prelube 2000™ can also be used to blow in the hollow microtubes intended to hold future microcables. Over the last decade, Prelube 2000™ has been proven in the blowing of tens of thousands of kilometers of cable in over 20 countries on a variety of cable blowing machines.

Features

- Polywater® Prelube 2000™ has proven superior to paraffin oils and cable pulling lubricants for cable blowing. The use of this lubricant results in longer installation distances.
- Polywater® Prelube 2000™ is recommended by most blowing equipment manufacturers. It increases installation distance on all types of machines.
- Polywater® Prelube 2000™ is more economical than prelubricated duct.
- Polywater® Prelube 2000™ is compatible with common fiber optic cable jacket.

Application

A properly installed duct system with pressure-tight duct splices is an absolute necessity for efficient cable blowing. Follow the equipment manufacturer's instructions. The duct must be clean, dry, and mandral tested. Clean the duct by blowing a tight-fitting foam sponge through the duct with high pressure. If excess water or dirt comes from the duct, repeat the process. Prelube 2000™ is effective at a coating thickness of 0.5 mg/cm^2.

For smoothwall duct and high air speed machines (no missile), squeeze the recommended amount of Prelube 2000™ Lubricant from the table below into the duct. Spread the lubricant by blowing a foam carrier through the duct. The quart squeeze bottle (Cat. # P-35) is a good package for this type of application.

Duct Size	Lubricant Quantity	
	per 1,000 Feet	per Kilometer
1 inch (2.5 cm)	4 fl. oz.	400 ml
1.25 inch (3 cm)	5 fl. oz.	500 ml
1.5 inch (4 cm)	6 fl. oz.	600 ml
2 inch (5 cm)	8 fl. oz.	800 ml

For smooth wall duct (ID 1 to 1.25 inch) and piston type machines, use 5 to 10 fl oz per thousand feet of duct (0.5 to 1.0 liter per kilometer). Place 75% of the lubricant in front of the missile and the rest behind it. The lubricant is spread by the missile as the cable is blown.

Polywater®

Prelube

5000™

for blowing fiber optic microcables

Polywater® Prelube 5000™ is more concentrated than the Prelube 2000™. It is intended for blowing microcable into small diameter microtubes. The improved chemistry allows this product to spread further and lower friction at extremely low coating levels. The lower viscosity allows practical application into the microtubes.

Features

- Polywater® Prelube 5000™ is easy to use. It can be squeezed into the small diameter microducts.
- Polywater® Prelube 5000™ works at extremely low coating levels. It coats further and more effectively than conventional blowing lubricants.
- Polywater® Prelube 5000™ has proven superior in side-by-side testing in blown microcable installations.
- Polywater® Prelube 5000™ is compatible with known microcable plastic jackets. However, it should not be used for resin-coated fiber cables.

Application

The microduct tubing must be pressure tight. Clean and dry the tubing by blowing a tight fitting foam sponge through the microduct with high pressure. If excess water or dirt comes from the microduct, repeat the process. Trapped water can block the air flow.

Prelube 5000™ is effective at quantities *as low* as 0.05 mg/cm^2. Squeeze recommended amount of lubricant into microduct. Quantity can be measured with a syringe or estimated based on duct fill length (table below). Spread lubricant by blowing a foam carrier or sponge through the microduct as many times as necessary to avoid puddling at the front of the duct.

Tube Size (OD/ID)	Lubricant per Kilometer Tube		Lubricant per 1,000 Feet Tube	
	Volume Required	Microtube Fill Length	Volume Required	Microtube Fill Length
14/12 mm	29 ml	26 cm	0.30 fl. oz.	3 in.
12/10 mm	24 ml	31 cm	0.25 fl. oz.	4 in.
10/8 mm	19 ml	39 cm	0.20 fl. oz.	5 in.
8/6 mm	14 ml	52 cm	0.15 fl. oz.	6 in.
7/5 mm	12 ml	62 cm	0.13 fl. oz.	7 in.
5/3.5 mm	9 ml	88 cm	0.09 fl. oz.	10 in.
4/3 mm	7 ml	103 cm	0.08 fl. oz.	12 in.

The quantities of lubricant appropriate for any job will vary with the size, type, and condition of the duct. Use the recommendations above as a place to start and adjust as necessary.

Cost Effectiveness

Polywater® Prelube 2000™ offers significant cost savings over "factory-lubricated" duct. In high quality HDPE duct, it lubricates efficiently at coating levels of 0.5 mg/cm² of duct surface. At these levels, the lubricant cost for 1.25" (3.2 cm) duct is approximately $2 per 1,000 feet ($6 per kilometer), much lower than the additional cost for factory-lubricated duct.

Polywater® Prelube 5000™ is extremely efficient and cost effective. It lubricates at coating levels as low as 0.05 mg/cm^2 of the tubing's interior surface. At these levels, the lubricant cost is $0.20 to $0.75 per 1,000 feet ($0.60 to $2.20 per kilometer) depending on microtube size.

Packaging and Catalog Numbers

Package Size	Prelube 2000™	Prelube 2000™ - Winter Grade	Prelube 5000™ for Microcables
1-quart squeeze bottle (0.95 l)	P-35	WP-35	
1-gallon pail (3.8 l)	P-128	WP-128	
5-gallon pail (18.9 l)	P-640	WP-640	
8-fl ounce squeeze bottle			PM-8

References

1. Installation of Fiber Optic Cables in Duct, W. Griffioen, Plumettaz S. A., 1993

2. The Use of the High Air-Speed Blown-Cable System for Placing Optical-Fiber Cables in Ducts, P. R. Briggs et al, NFOEC Conference, 1993

3. Analysis and Measurement of Friction in High Speed Air Blowing Installation of Fiber Optic Cable, J. M. Fee et al, NFOEC Conference, 1995

See the web page **www.polywater.com/airblow.html** for additional information on high speed air assisted cable installation.

LIT-PL2000FLYER/REV001

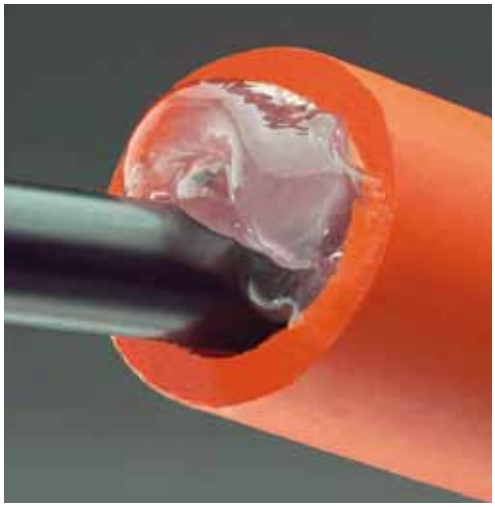
Makers of Polywater® and Dyna-Blue® Cable Lubricants and Pull-Planner™ 2000 Software

American Polywater® Corporation

11222 60th St. N.
Stillwater, MN 55082
U.S.A
1-800-328-9384
1-651-430-2270
fax 1-651-430-3634
www.polywater.com(URL)
support@polywater.com

IceFree™

Antifreeze Gel System



A specialty, non-freezing gel which is pumped into conduits (around cable) to prevent water ingress and subsequent ice formation.

This system has successfully protected fiber optic cable in thousands of bridges exposed to below freezing temperatures.

- **Prevents water ingress and ice formation in innerducts and conduits**
- **Protects fiber optic cable from ice pressure-induced microbends**
- **Compatible with cable jacket and duct**
- **Safe for the environment**
- **Patented system**
- **Avoids system downtime due to cold-weather signal degradation**
- **Protects all cable from ice damage**
- **Soft gel allows cable removal for repair or upgrade**
- **Install once for multi-year protection**
- **Installation video and literature available**

American Polywater® Corporation
11222 60th St. N.
Stillwater, MN 55082
U.S.A
1-800-328-9384
www.polywater.com **1-651-430-2270**
support@polywater.com f ax 1-651-430-3634

LIT-WSFLYER/REV002

www.polywater.com/icefree.html

Polywater® SPLICE SHIELD™

PROVIDES A PROTECTIVE ENVIRONMENTAL BARRIER AGAINST MOISTURE, CORROSION AND OILS

Polywater® Splice Shield™ Environmental Barrier is packaged in an easy-to-use self dispensing cartridge. Only one application is needed for a thick protective coating over "taped"splices on low and medium voltage cables, as long as the shield is not damaged. Polywater® Splice Shield™ dries quickly and does not need to be "tack free" before direct burial.

Splice Shield™ sealant leaves a thick flexible coating that offers excellent protection against oil, water and corrosion. It contains no dangerous low-TLV or highly flammable solvents. The kit contains all the materials needed to seal multiple splices.

"Don't just tape and hope" Use Splice Shield!

- **Reusable Dispensing Cartridge**
- **Only One Application Needed**
- **No Harmful or Highly Flammable Solvents**
- **High Dielectric Strength**
- **Zero VOC's**

Catalog #	Description	Units/Case	
CS-KIT	1 Polywater® Splice Shield™ 2-part self-dispensing cartridge 5 Mixing sticks 5 Single gloves	10	

To view technical information on our website go to:
Support Page: www.polywater.com/spliceshield.asp
Application Videos: www.polywater.com/videos.asp

American Polywater® Corporation
phone: 1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
email: support@polywater.com
11222 60th St. N, Stillwater, MN 55082, U.S.A

ADHESIVES | CLEANERS | LUBRICANTS | **SEALANTS** WWW.POLYWATER.COM

LIT-CSFLYER/REV004

Polywater® Splice Shield™ Environmental Barrier

American Polywater® Corporation

TECHNICAL DATA SHEET

Description:

Polywater® Splice Shield™ Environmental Barrier protects cables and splices from moisture, corrosion and oils. Splice Shield™ creates a thick, flexible barrier for long term protection of low and medium voltage cable jacket. It coats and protects electrical apparatus from moisture and contaminants in numerous applications.

Polywater® Splice Shield™ dries quickly and can be taped for immediate burial. Only a single application is needed to create a thick, long-lasting barrier. Once cured, it remains flexible to withstand the rigors of contraction and expansion cycles. Polywater® Splice Shield™ is chemically resistant to many contaminants, including dielectric oil and gasoline.

Polywater® Splice Shield™ is packaged in an easy-to-use, self-dispensing syringe-style cartridge. The cartridge is re-sealable allowing for convenient multiple applications. Splice Shield™ contains no dangerous, low-TLV or highly flammable solvents and is safe to use in enclosed spaces.

Dielectric Breakdown Jacket Test

Dielectric breakdown testing is based on UL 2556 Sec 6.3, “Wire and Cable Test Methods”. A ½-inch ring jacket material is removed from a 2 awg, aluminum XHHW cable. The bare area is repaired with Splice Shield™ Environmental Barrier and electrical tape, according to instructions. Repaired cable is soaked in water for 28 days and tested. Voltage is ramped up to 6000 volts in 500 volt intervals. Voltage is held for 10 seconds at each point.

28 Day, Ambient Water Soak

Voltage	Result	Leakage
6,000 Volts	No Failure	0 µA

28 Day, 50°C Water Soak

Voltage	Result	Leakage
6,000 Volts	No Failure	<3 µA

Polywater® Splice Shield™ with splice and tape

Product Benefits

- Seals out moisture and water
- Protects against electrical faults
- High dielectric strength
- Reusable dispensing syringe
- Only one application needed
- Zero VOC’s

Applications

Splice Shield™ Environmental Barrier bonds to cable jacket materials and these types of metals:

- PVC
- HDPE
- Copper
- Aluminum
- Steel
- Stainless steel

Component Properties:

Polywater® Splice Shield™ is a two-part barrier coating. Each part is a thin paste packaged in a 1/1 ratio syringe.

Property	Part A (Resin)	Part B (Curing Agent)
Color	Black	Off-white
Form	Thin paste	Thin paste
Odor	Slight sulfur	Slight sulfur
VOC Content:	0 g/L	0 g/L
Specific Gravity	1.25	1.10
Solvent Content	None	None

Cured Properties:

Polywater® Splice Shield™ cures to form a flexible, solid environmental barrier.

Property	Typical Result
Appearance	Glossy gray
Peak Exotherm @ 70°F	< 140°F
Durometer Hardness Shore D Shore A	 18 78
Water Absorption	< 2%
Flexural Stress (ASTM D790)	53 psi

Adhesion Testing:

Substrate	Result
PVC to PVC	243 lbs/in^2
HDPE to HDPE	112 lbs/in^2
Steel to Steel	215 lbs/in^2
Stainless to Stainless	173 lbs/in^2
Copper to Copper	231 lbs/in^2
Aluminum to Aluminum	219 lbs/in^2

Tested using ASTM D1002. Samples are sanded, cleaned and allowed to cure for 24 hours.

Electrical Testing:

Polywater® Splice Shield™ is non-conductive. Dielectric strength was tested using a 2,000 volts/second rate of rise and type 3 circular electrodes with a 0.25-inch diameter. All tests were performed in insulating oil to prevent discharges and flashovers. Results are the average of 10 trials.

Sample Thickness	Breakdown Voltage	Dielectric Strength
0.06 Inch	31 kV	520 Volts/Mil

Tested using ASTM D149, Method A. Platen samples are cast and fully cured.

Chemical Resistance:

Polywater® Splice Shield™ chemically resists ultraviolet light, water, and oil.

Oil resistance was tested using ASTM D543. The Splice Shield™ sample was mixed, cast and cut into a dogbone using Die D. It was then immersed in the reagent and aged for7 days. Tensile strength was compared to a control that was air aged.

Fluid	Comparison to Control
Dielectric Oil	> 100%
Hydrocarbon Fluid	> 100%
Gasoline	> 100%

Additionally, Splice Shield™ samples were mixed, cast and immersed in a variety of fluids for 7 days. Weight change over time was measured.

Fluid	Weight Gain
1% Dish Detergent	9.9% (pass)
3% Bleach	5.8% (pass)
10% Salt Solution	4.3% (pass)
20% Caustic (pH 12)	3.5% (pass)

Polywater® Splice Shield™ shows good resistance to a variety of oils and chemicals. It provides good protection under a variety of field conditions.

Installation:

Polywater® Splice Shield™ is easy to use.

1. Surface must be clean, dry, and free from oil, wax and dirt.

2. For large cable jacket cuts or to improve performance, tape damaged area prior to Splice Shield application. Rigid metal and plastic surfaces may be sanded prior to application to improve adhesion.

3. Remove the re-sealable cap from the end of the cartridge. Retain for multiple uses.

4. Depress the double pistons to dispense the two materials.

5. Mix resin and hardener until they are a uniform color (about 30 seconds).

6. Apply mixed resin over the area to be protected with a gloved finger or a mixing stick.

7. The sealant will be tack free in 25 minutes at room temperature; fully cured in 24 hours.

8. For immediate burial of repaired cable, cover the sealant with electrical tape.

9. To close the cartridge for reuse: wipe tips, retract piston slightly and plug with re-sealable cap.

Working Temperature 45° to 120°F (5° to 50°C)

For full installation information, please see the **Splice Shield™ Installation Instructions** *(www.polywater.com/CSInstructions.pdf)*

Environmental Resistance:

Polywater® Splice Shield™ moves and flexes with low and medium voltage cable. It withstands the rigors of the changing, cable environment.

Cured Sealant Temperature Use Range
-60° F to 212° F (-51° C to 100° C)

Temperature Cycle Testing:
10 cycles from 0°F to 130°F showed no significant change in adhesion. 7 day aging at 212°F showed no significant change in adhesion.

Storage and Handling:

Keep cool, dry and away from sunlight. Reseal syringe after use. Protect from freezing. Dispose in accordance with local regulations.

Product shelf life is one year. Shelf life is one month after the product is opened.

Clean-up

Use a clean towel with soap and water or Polywater® Grime-Away™ to clean hands or surfaces.

Safety:

Polywater® Splice Shield™ has a low level of toxicity. Good industrial hygiene practice and appropriate precautions should be employed during use. Pre-packaged cartridge controls and reduces exposure. The reacted product is a non-toxic, inert resin. See SDS for more information.

Model Specification:

The statement below may be inserted into a customer specification to help maintain engineering standards and ensure work integrity.

Approved environmental barrier is Polywater® Splice Shield™ or CS-KIT. The environmental barrier shall come in a multiple-use syringe that dispenses material in proper ratio and without special tools. It shall not contain any solvents. The cure rate of the material shall be fast, becoming tack-free in 25 minutes @ 75°F

Cured product shall be suitable for use on various low and medium voltage cable materials. It shall have excellent adhesion to a variety of cable jackets and metals. Once cured, the barrier shall be water-tight and flexible. It shall be impervious to water, salt water, oils, and dilute acids and bases. Cured barrier shall withstand temperature extremes from -60°F to 212°F.

Environmental barrier shall not contain any metals and shall not corrode. It shall be non-conductive with minimum dielectric breakdown voltage of 520 Volts/mil as measured by ASTM D 149. Cable dielectric breakdown testing according to UL 2556 Sec 6.3 should yield no failure at 6,000 Volts with 0 µA leakage after 28 days water soak at ambient temperature. Cable dielectric breakdown testing according to UL 2556 Sec 6.3 should yield no failure at 6,000 Volts with <3 µA leakage after 28 days water soak at 50°C.

Order Information:

Cat #	Package Description
CS-KIT (1 units/case)	1 – Polywater® Splice Shield™ two-part, self-dispensing syringe with resealing cap 5 – Mixing Sticks 5 – Single gloves

Makers of Polywater® and Dyna-Blue® Cable Lubricants and Pull-Planner™ Software

American Polywater® Corporation

11222 60th St N
Stillwater, MN 55082
U.S.A
1-800-328-9384
1-651-430-2270
http://www.polywater.com (URL) support@polywater.com (e-mail)

American Polywater's

BonDuit® Conduit Adhesive

A High Strength Adhesive for Bonding Polyethylene, PVC, Fiberglass, Metals and Composites

BonDuit® Conduit Adhesive Bonds Polyethylene To:

- PVC Couplings
- Above Ground Conduit
- Steel Sweeps and Elbows
- FRE® & Composite Connections
- Transition Couplings

CREATES STRONG, LONG-LASTING BONDS

BonDuit® Adhesive creates ***airtight*** and ***watertight*** splices. Bonds are durable with high tensile strength within an hour. The strong bonds withstand movement and vibration.

Polyethylene to Polyethylene

Polyethylene to Fiberglass

Polyethylene to Steel

BonDuit® Conduit Adhesive

BonDuit® Conduit Adhesive is Easy to Use and Cost Effective

BonDuit® Adhesive requires no special training and minimal labor. Total installation time is less than 5 minutes. Convenient kit contains all material to make the connection. BonDuit® provides a low cost solution compared to alternative methods.

Applications Per Cartridge

Conduit Size	Applications per BT-CARTRIDGE
1-1/4 inches	15-20
1-1/2 inches	12-18
2 inches	10-15
2-1/2 inches	8-12
3 inches	6-9
4 inches	4-6
6 inches	2-3

BonDuit® Conduit Adhesive Kit Ordering Information

Catalog #	Description	Units/Case
BT-KITG	50-mL adhesive cartridges – 2 Mixing nozzles – 8 Sanding cloth – 1 Pre-treating wipe (cat# RP-1) – 8 Dispensing Tool (cat# TOOL-50-11) – 1	1
BT-KIT	Same as above product TOOL-50-11 NOT INCLUDED	1
BT-KITB6G	50-mL adhesive cartridges – 12 Mixing nozzles – 48 Sanding cloth – 6 Pre-treating wipe (cat# RP-1) – 48 Dispensing Tool (cat# TOOL-50-11) – 1	1
BT-KITB6	Same as above product TOOL-50-11 NOT INCLUDED	1
TOOL-50-11	Dispensing Tool – 1	1
MXR-12T-10	Package of 10 mixing nozzles	1
BT-CART12PK	50-mL adhesive cartridges – 12 Mixing nozzles – 36	1
RP-1	Saturated 5” x 8” pre-treating wipe	96

To view technical information on our website go to:
Support Page: **www.polywater.com/bonduit.asp**
Application Videos: **www.polywater.com/videos.asp**

American Polywater® Corporation
phone: 1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
email: support@polywater.com
11222 60th St. N., Stillwater, MN 55082, U.S.A

ADHESIVES | CLEANERS | LUBRICANTS | SEALANTS WWW.POLYWATER.COM

BonDuit® Conduit Adhesive

American Polywater® Corporation

TECHNICAL DATA SHEET

Description:

BonDuit® Conduit Adhesive joins polyethylene duct to PVC, fiberglass, and metal duct using standard PVC couplings. This rapid-cure, two-part resin adhesive forms a durable bond for a strong, permanent, water-tight joint.

BonDuit® Conduit Adhesive is a versatile field-friendly conduit joining solution. It works for multiple conduit types and sizes. It is easy to use and no special training is required.

Adhesive Shear Strength:

Typical bond strengths were measured by joining two pieces of HDPE conduit with a PVC coupling and BonDuit® Adhesive. The force required to pull apart the joint after 24 hours at 70° F was measured.

Conduit Diameter	Pullout Force
1 Inch	724 lbs_f
1½ Inch	1233 lbs_f
2 Inch	2,025 lbs_f
4 Inch	5,333 lbs_f

Results based on 3rd-party laboratory testing.

Hydrostatic (Pressure) Testing:

BonDuit® Conduit Adhesive forms a water-tight joint. HDPE duct was joined to PVC duct with a PVC coupling and the adhesive. The ducts were filled with water, sealed, pressurized to 120 psi, and observed over time for leakage. The joint was then subjected to a short duration, high pressure test.

Test Duration	Result
1,000 Hours	No Leaks

Continuous pressure test based on ASTM D1598, "Time to Failure of Plastic Pipe Under Constant Internal Pressure".

Short Duration High Pressure (Burst Test)

Maximum Pressure	Result
>250 psi	No Leaks

Burst test based on ASTM D1599, "Resistance to Short-Time Hydraulic Pressure of Plastic Pipe, Tubing and Fittings (Burst Test)".

Bonduit® Conduit Adhesive is supplied in a two-part cartridge and is mixed as it is applied.

Product Benefits:

- Easy to use
- Fast cure
- Durable bond
- Water-tight and air-tight seal
- High tensile strength
- Suitable for most common ducts

End Use:

BonDuit® Conduit Adhesive bonds polyethylene to:

- PVC Couplings
- Concrete Vaults
- Transition Couplings
- Above Ground Conduits
- Steel Sweeps and Elbows
- Fiberglass and Composite Connections

Component Physical Properties:

BonDuit® Conduit Adhesive is a 2-part resin. Both parts are thin pastes packaged in a mixing cartridge.

Property	Part A (Resin)	Part B (XL Agent)
Color	Dark Grey/Black	White/Light Yellow
Form	Paste	Paste
Odor	No Odor	Slight Sulfur Odor
VOC:	0 g/L	0 g/L
Specific Gravity	< 2	< 2

Typical Cured Resin Properties:

BonDuit® Conduit Adhesive cures to form a solid, durable resin seal.

Typical Property (7 Days cure @ 70º F)	
Color	Grey
Peak Exotherm @ 70º F	< 200º F
Hardness (Shore D Durometer)	70 – 80
Flexibility (ASTM D790)	> 2%
Dielectric Strength (ASTM D149)	450 Volts/Mil (Nonconductive)
Air-tight (continuous):	120 psi

Typical Adhesive Shear Strength:

Substrate	Result
HDPE to PVC	275 lbs/in^2
HDPE to Steel	550 lbs/in^2
HDPE to Aluminum	325 lbs/in^2
HDPE to Fiberglass	175 lbs/in^2
Fiberglass to Steel	525 lbs/in^2
Fiberglass to PVC	125 lbs/in^2
Fiberglass to Fiberglass	375 lbs/in^2

Tested using ASTM D1002. Samples sanded, cleaned and cured for 24 hours.

Typical Impact Resistance:

Substrate	Result
HDPE	24.8 in-lbs
PVC	37.2 in-lbs
Galvanized Steel	22.3 in-lbs
Fiberglass	37.2 in-lbs

Tested using ASTM G14. Samples are sanded, cleaned and allowed to cure for 24 hours.

Bonding Materials:

BonDuit® Conduit Adhesive adheres to:

- Polyethylene
- PVC, CPVC
- Composite
- PEX
- ABS
- Polypropylene
- Fiberglass
- Concrete
- Porcelain
- Steel
- Aluminum
- Copper

Environmental Resistance:

BonDuit® Conduit Adhesive can withstand the typical rigors of the conduit environment.

Temperature Cycle Testing: 10 cycles from 0º F to 130º F showed no significant change in adhesion

BonDuit® Conduit Adhesive, if applied and frozen before cure, shows no significant change in adhesion when warmed and allowed to cure at a later time.

BonDuit® Conduit Adhesive withstands ultraviolet and direct sunlight exposure with no decrease in functionality.

Chemical Resistance:

The chemical resistance of a polyethylene to PVC bond (joined with BonDuit® Adhesive) is tested by measuring shear strength after exposure to the reagent compared to a non-exposed control. The joint is allowed to cure 7 days, immersed in the reagent, and then aged at ambient temperature for 3 months.

Chemical Exposure	Percent of Control
Salt Water (4%)	85% (Pass)
Alkaline Soap Solution (pH 12)	100% (Pass)
Odorless Mineral Spirits	>100% (Pass)

The BonDuit® Adhesive bond shows good resistance to salt water, alkaline solutions, and odorless mineral spirits (paraffinic solvent). A 6-month water & oil soak test also shows no significant change in adhesion compared to a control.

Application:

BonDuit® Adhesive is easy to use. For full installation information, please see BonDuit® Usage Instructions. *(www.polywater.com/BTinstructions.pdf)*

One 50-ml cartridge will produce a ¼-inch bead of the mixed adhesive approximately 42 inches long.

Preparation:
Proper surface preparation ensures a strong, long-lasting, airtight and watertight bond. The surface should be sanded and cleaned with a RP™ Cleaner Wipe to remove oils and displace any remaining water. Adhesion using different surface preparation methods was tested using a lap shear test. In this test, BonDuit® Conduit Adhesive is applied to create an overlapping bond between HDPE and PVC.

Surface Preparation	Percent of Control Bond Shear Strength
No Preparation	100% (Control)
Cleaner Only	120%
Sanding Only	410%
Cleaner & Sanding	480%

Application Temperature
Working temperature for BonDuit® Conduit Adhesive is 35°F to 95°F (2°C to 35°C).

Cool Weather Application
In cool weather (below 60°F, 16°C) keep BonDuit® Conduit Adhesive warm before using, above 60°F (16°C). Keep couplings in a warm area before use. It may be necessary to heat the transition joint to force adhesive cure. Below 35ºF (2°C), the joint should be heated to cure the adhesive.

Warm Weather Application
In warm weather (above 85°F, 29°C), keep BonDuit® Conduit Adhesive cool, below 70°F (21°C). This will help keep the adhesive from curing before coupling is attached. If possible, use adhesive to make bonds in the cooler mornings and out of direct sunlight to slow down cure rate.

Safety:

BonDuit® Conduit Adhesive has a low level of toxicity. Good industrial hygiene practice and appropriate precautions should be employed during use. Provide appropriate ventilation/respiratory protection against decomposition products during welding/flame operations (i.e. torches used to install heat shrink products) on or near cured product. See SDS for specific details.

Cure Rate:

BonDuit® Conduit Adhesive develops a strong bond, allowing movement or burial quickly.

Temp.	Working Time	Set Time
35°F (2°C)	40 min	7 hrs
52°F (11°C)	20 min	3 ½ hrs
60°F (16°C)	10 min	1 ½ hrs
70°F (21°C)	6 min*	60 min
88°F (31°C)	4 min*	40 min

After one hour at 70°F (21°C), the BonDuit® resin will reach approximately 50% of its cure strength and will “set”. It will continue to cure and will reach maximum bond strength after approximately 24 hours at 70°F (21°C).

Once cured, conduit joints made with BonDuit® Adhesive will hold adequate air pressure for cable blowing operations.

Cure Time at 70°F	Air Pressure	Result
90 Minutes	150 psi	Pass
120 Minutes	200 psi	Pass

The prepared conduit system holds the above pressure for 10 minutes.

Installation:
Joints made with BonDuit® Conduit Adhesive can be placed into position once the connection is made. The adhesive will cure under water or under ground. Conduits can be put into service once full cure is reached.

Storage and Handling:

Keep cartridge tightly closed in a cool, dark, dry location. Reseal cartridge after use. Keep away from sources of ignition and protect from freezing. All cartridges should be disposed of in an environmentally safe manner and in accordance with governmental regulations.

Unopened product has a shelf life of 18 months.

Model Specification:

The statement below may be inserted into a customer specification to help maintain engineering standards and ensure work integrity.

Approved conduit joining system is BonDuit® Conduit Adhesive. The conduit adhesive shall come in a multiple-use cartridge to bond various conduit connections without special fitting or positioning jigs. The packaging shall automatically mix and meter the adhesive. The cure rate for the adhesive shall be fast, reaching 50% of final strength in one hour (@ 75° F), and 80% of final strength in two hours (@ 75° F). The peak exotherm temperature of mixed product shall not exceed 200° F (20 gram sample.) Product shall be suitable for use on various duct materials, multiple duct sizes and connection types.

Once cured, the adhesive seal shall be airtight and watertight. A one-inch, PVC coupling sealed to a polyethylene duct with the adhesive shall hold 120 psi air pressure after curing one hour at 75° F. The pull-out strength of a two-inch polyethylene duct sealed to a PVC coupling shall be at least 910 lbs force after curing one hour at 75° F and at least 1820 lbs force after curing for 24 hours. The adhesive shall have a minimum flexural strain of 2% as measured by ASTM D790.

The cured adhesive shall be resistant to water, salt water, oils, and uv degradation. The cured bond shall withstand temperature extremes from -60° F to 250° F. It shall withstand multiple freeze-thaw cycles. The cured product shall be non-conductive with a minimum dielectric strength of 450 Volts/Mil as measured by ASTM D149.

Order Information:

Cat #	Package Description
BT-KITG	Kit contains: 2 50-ml BonDuit® Adhesive Cartridges 8 Mixing Nozzles 1 Strip of Sanding Cloth 8 RP-1 Cleaning Wipes 1 Instruction Sheet 1 Dispensing Tool
BT-KIT	Kit contains: 2 50-ml BonDuit® Adhesive Cartridges 8 Mixing Nozzles 1 Strip of Sanding Cloth 8 RP-1 Cleaning Wipes 1 Instruction Sheet (Dispensing tool not included.)
BT-KITB6G	Bulk kit contains 6 Individual Kits, BT-KIT 1 Dispensing Tool Included
BT-KITB6	Bulk kit contains 6 Individual Kits, BT-KIT (Dispensing tool not included.)
TOOL-50-11	1 Dispensing Tool
MXR-12T-10	10 Mixing Nozzles
BT-CART12PK	12 50-ml BonDuit® Adhesive Cartridges in a Package

Lit-BTTECH/REV004

Makers of Polywater® and Dyna-Blue® Cable Lubricants and Pull-Planner™ Software

American Polywater® Corporation

11222 60th St. N
Stillwater, MN 55082
U.S.A
1-800-328-9384
1-651-430-2270
http://www.polywater.com (URL) support@polywater.com (e-mail)

Polywater® FST™-250
FOAM DUCT SEALANT MULTI-USE CARTRIDGE

UL Recognized Component

Actual cross section of cured FST™ closed-cell foam. FST™ closed-cell foam was engineered for harsh construction environments.

- Seals Out Water, Sewer Gases, and Rodents From Conduits
- Reenterable
- Holds Over 22' of Water Head Pressure
- Seals Multiple Conduits
- Works Great with High-Ratio Caulking Guns
- Compatible with Cables and Conduits
- Complies with TIA-758-B Standard 5.1.1.2.8, 5.4.2.3 and 7.4.2.8.1
- Complies U.S.A. NEC Sections 225.27, 230.8, 300.5 (G), and 300.7 (A) on Raceway Seals

Open-Celled Canned Foams & Duct Putty

- Do Not Hold Water-Head Pressure
- Do Not Fully Cure in Conduits
- Sag and Dry Out Over Time

Polywater® FST™-250 Duct Seal/Water Block Foam Kit

UL Recognized Component

Polywater® FST™-250 Duct Seal/Water Block Kit contains a high-ratio caulking gun style cartridge filled with a two-part foam base. The foam base is mixed in equal parts as it is pushed through the mixing nozzle. When mixed and injected, the foam expands and hardens, keeping water, sewer gases, acids, greases, insects, rodents, etc., out of the conduit. The foam has good wetting and adhesion to metals, plastics, and concrete. The kit contains enough material to seal multiple sized conduits (see quantity calculator online). A separate, reusable, high-ratio caulking gun is used to inject the foam.

Polywater® FST™ Product #	Description	Units/Case
FST-250KIT1	8.5-oz cartridge (cat# FST-250) – 1 24" Foam damming strips (cat# FST-DAM) – 4 Mixing nozzles (cat# MXR-30T-10) – 3 Pair disposable gloves – 1 Positioning rod for foam dam – 1 Pre-treating wipe (cat# HP-P158ID) – 1 24" abrasive strip (sanding cloth) – 1 Resealing cap – 1 Instruction sheet – 1 *TOOL-250 SOLD SEPARATELY*	1
FST-250KIT	6 units of the above product	6
FST-250	8.5-oz cartridge with mixing nozzle	12
MXR-30T-10	Mixing nozzle 10-PACK for FST-250	1
TOOL-250	High-ratio caulking gun	1
FST-DAM	24" Foam damming strip	24
HP-P158ID	Conduit pre-treating wipe	144
Polywater® FST MINI is specifically for conduits ¾" to 1.5"		
FST-MINI-1	50-mL cartridge – 1 Mixing nozzles – 2 Foam discs – 6 Pair of disposable gloves – 2 Instruction sheet – 1	1
FST-MINI-1G	Same as kit above *Includes TOOL-50-11*	1
FST-MINI-B6	6 FST-MINI-1	1
FST-MINI-B6G	6 FST-MINI-1 *Includes TOOL-50-11*	1
TOOL-50-11	Dispensing Tool for FST-MINI	1
MXR-20T-10	Mixing nozzle 10-PACK for FST-MINI	1

To view technical information on our website go to:
Support Page: www.polywater.com/ductseal.html
Lubricant Application Videos: www.polywater.com/videos.asp

American Polywater® Corporation

phone: 1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
email: support@polywater.com
11222 60th Street North, Stillwater, MN 55082, U.S.A.

ADHESIVES | CLEANERS | LUBRICANTS | **SEALANTS** WWW.POLYWATER.COM

Polywater® FST™ Duct Sealant

Finally, a sealant that meets the NEC codes for Raceway Seals...

...THAT'S EASY TO INSTALL AND REMOVE FROM CONDUITS.

- Re-enterable
- Stops gases
- Holds 22 feet of water head pressure continuously
- Compatible with wire and cable jackets

Polywater® FST™ Foam Duct Sealant meets and exceeds the NEC code requirements for sealing conduits. Polywater® FST™ is superior to both duct putty and aerosol cans of foam because it has been tested for cable compatibility; holds 22 feet of water head pressure continuously and up to 90 feet intermittently; prevents the passage of gas; does not sag; will not dry out; and is re-enterable. FST™ sealant is chemically resistant to gasoline, oils, dilute acids and bases, and most unsaturated hydrocarbons. Review our technical bulletin to see our extensive ASTM product testing.

FST™ meets the following from the NFPA 70® National Electrical Code® 2008, 2011 Editions:

NEC 225.27 Raceway Seal. Where a raceway enters a building or structure from an underground distribution system, it shall be sealed in accordance with 300.5(G). Spare or unused raceways shall also be sealed. Sealants shall be identified for use with the cable insulation, shield, or other components.

NEC 230.8 Raceway Seal. Where a service raceway enters a building or structure from an underground distribution system, it shall be sealed in accordance with 300.5(G). Spare or unused raceways shall also be sealed. Sealants shall be identified for use with the cable insulation, shield, or other components.

NEC 300.5(G) Raceway Seals. Conduits or raceways through which moisture may contact live parts shall be sealed or plugged at either or both ends.

Informational Note: Presence of hazardous gases or vapors may also necessitate sealing of underground conduits or raceways entering buildings.

NEC 300.7 (A) Sealing. Where portions of a cable raceway or sleeve are known to be subjected to different temperatures and where condensation is known to be a problem, as in cold storage areas of buildings or where passing from the interior to the exterior of a building the raceway or sleeve shall be filled with an approved material to prevent the circulation of warm air to a colder section of the raceway or sleeve. An explosion proof seal shall not be required for this purpose.

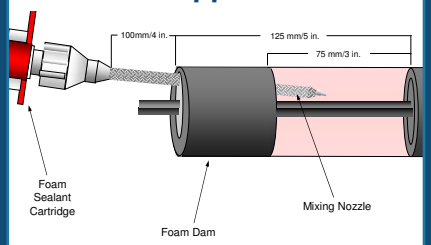
NEC 501.15 (B)(2) Conduit Seals, Class 1 Division 2: A conduit seal shall be required in each conduit run leaving a Class 1, Division 2 location... and it shall be designed and installed to minimize the amount of gas or vapor within the portion of the conduit installed in the Division 2 location... Such seals shall not be required to be explosion proof..."

** As always with the NEC code it is prudent to check with and get approval from the AHJ before installing any product in a hazardous location area due to varying interpretations*

AVOID THIS!

www.polywater.com/FSTspec.pdf

FST™ Application



www.polywater.com/videos.ASP

American Polywater® Corporation

phone: 1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
email: support@polywater.com
11222 60th Street North, Stillwater, MN 55082, U.S.A.

ADHESIVES | CLEANERS | LUBRICANTS | **SEALANTS** WWW.POLYWATER.COM

LIT-FST250NECFLYER/REV001

American Polywater® Corporation

11222 60th Street North
Stillwater, MN 55082 U.S.A.
Phone: 1-651-430-2270
Fax: 1-651-430-3634
Email: support@polywater.com
www.polywater.com

To: Polywater® Product Specifier
From: American Polywater Corporation - Electrical Division
Date: July 28, 2011
RE: Polywater FST-250 Foam Duct Sealant

Polywater® FST foam duct sealant meets and exceeds the NEC code requirements for sealing conduits. Polywater® FST is superior to both duct putty and aerosol cans of foam because it has been tested for cable compatibility, holds 15 feet of water-head pressure continuously and up to 40 feet intermittently, prevents gas from passing through it, does not sag, will not dry out and is re-enterable. FST sealant is chemically resistant to gasoline, oils, dilute acids and bases, and most unsaturated hydrocarbons. Review our technical bulletin to see our extensive ASTM product testing.

NFPA 70® National Electrical Code® 2011 Edition

225.27 Raceway Seal. Where a raceway enters a building or structure from an underground distribution system, it shall be sealed in accordance with 300.5(G). Spare or unused raceways shall also be sealed. Sealants shall be identified for use with the cable insulation, shield, or other components.

230.8 Raceway Seal. Where a service raceway enters a building or structure from an underground distribution system, it shall be sealed in accordance with 300.5(G). Spare or unused raceways shall also be sealed. Sealants shall be identified for use with the cable insulation, shield, or other components.

300.5(G) Raceway Seals. Conduits or raceways through which moisture may contact live parts shall be sealed or plugged at either or both ends.
Informational Note: Presence of hazardous gases or vapors may also necessitate sealing of underground conduits or raceways entering buildings.

300.7 (A) Sealing. Where portions of a cable raceway or sleeve are known to be subjected to different temperatures and where condensation is known to be a problem, as in cold storage areas of buildings or where passing from the interior to the exterior of a building, the raceway or sleeve shall be filled with an approved material to prevent the circulation of warm air to a colder section of the raceway or sleeve. An explosionproof seal shall not be required for this purpose.

Duct Putty:

Open cell canned foam:

Polywater® FST-250:

American Polywater's

Foam Sealant (FST) Quantity Calculation

Page

This page will estimate the quantity of FST Foam Sealant needed and the correct sized package to seal different sized conduits.

http://www.polywater.com/calculators/fstcalculator.asp

FST™ Foam Sealant

American Polywater® Corporation

TECHNICAL DATA SHEET

Description:

FST™ Sealant is a two-part, high-expansion foam duct sealant. It keeps water, acids, dust, gases, insects, and rodents out of the duct. FST™ Sealant expands and hardens to a “closed cell”, rigid structure. This permanent, but removable, seal blocks both water and gas under moderate pressure.

FST™ Sealant comes in a multi-use single plunger caulking tube package. The foam wets and adheres to metals, plastics, and concrete, and can seal ducts of different sizes, base materials, and shapes. It will conform around complex cable fill configurations. A kit contains everything required to install the duct block (application tool available separately).

Water Blockage:

FST™ Sealant is an excellent water block. To test water blocking performance, it is installed into a conduit according to standard procedures, forming a 3-inch plug. Water is added to the system and then pressurized to create a “water-head”.

Condition	Result
HDPE Duct, (SDR 13.5) No Cables	Holds 7 days at 30 psi (70 feet of water)
PVC Conduit, No Cables	Holds 450 days at 10 psi (22 feet of water)
PVC Conduit, 3 MDPE Cables	Holds 15 min at 40 psi (90 feet of water)
PVC Conduit, 3 MDPE Cables *bent* 45°, opposite directions for 5 minutes	Holds 15 min at 40 psi (90 feet of water)
PVC Conduit, 3 MDPE Cables *pulled* with 15 lbs axial force for 4 hours	Holds 15 min at 40 psi (90 feet of water)

FST™ Sealant blocks considerable water-head pressure, even when forces are placed on the cable to stress the seal.

The FST™ Sealant comes in a caulking style (one plunger) tube. Package allows multiple seals. Mixing is done in the nozzle as the sealant is injected.

Product Benefits:

- Meets 2011 NEC Articles 225.27, 230.8,300.5(G), and 300.7(A) on Raceway Seals
- Creates a strong, resilient, chemically resistant seal
- Holds 22 feet water-head pressure continuous; 70 feet water-head intermittent
- Expands, cures and seals even when water is present
- Controlled injection quantity – no waste
- Seal tolerates cable movement and environmental extremes
- Compatible with common cable and wire jackets
- Single cartridge can seal multiple ducts
- Re-enterable – seal can be removed
- Complies with TIA-758-B Standard 5.1.1.2.8, 5.4.2.3 and 7.4.2.8.1

Official Approvals:

UL Recognized

Passes UL94
Class HBF fire retardant rating

Component Properties:

FST™ Sealant is a two-part, urethane foam. The liquid Part A and B are formulated to be mixed at a 1/1 ratio using the two-part coaxial caulking tube with the static mixing nozzle provided.

Property	Part A (Resin)	Part B (Curing Agent)
Color	Amber	Clear
Form	Liquid 250 cps	Liquid 650 cps
VOC Content:	0 g/L	0 g/L
Specific Gravity	1.2	1.1

Cured Properties:

FST™ Foam Sealant cures to solid, closed-cell foam.

Property	Typical Result
Appearance	Light yellow color with small, even cells
Closed Cell Percent	98%
Density	6 lbs/cu. ft.
Compressive Strength (ASTM D1621)	330 psi
Tensile Strength (ASTM 1623)	270 psi
Flexural Strength (ASTM D790)	460 psi
Seal Strength - Water	70 feet intermittent 20 feet continuous
Seal Strength - Air	>5 psi

Seal Strength - Air and Other Gases:

FST™ Sealant can seal out manhole gases. To test seal strength, a 3-inch FST™ seal is installed into conduit according to standard directions. The conduit is sealed and pressurized with both air and helium. Helium is a small molecule, less than half the size of methane gas, and was used in place of methane.

Condition	Result
Air, 10 psi, 168 hours	Holds Seal
Helium, 5 psi, 72 hours	Holds Seal

The FST™ Sealant closed cell foam will block air and other gases for an extended period of time.

Cable Removal/Theft Deterrent Testing

FST™ Sealant acts as a theft deterrent by sealing cables into the conduit. To test this, a 3-inch plug of FST is used to seal 3 cables in a conduit according to standard procedures. The force to pull out each cable is measured.

Cable Type	Average Pull Out Tension (lb_f)
2 AWG THHN	171
4/0 XHHW	320

Draka *prelubricated* HDPE Cable in Conduit (CIC)	Average Pull-Out Tension (lb_f)
1-¼ inch with (2) RHW-2 awg cables and ground	188*
1-½ inch with (3) RHW-2 awg cables and ground	179*

**Entire foam core pulled out of the conduit.*

FST™ Sealant increases the cable holding force, making removal by hand very difficult.

Cable Compatibility

FST™ Sealant is compatible with common cable jacket materials. It does not change physical or electrical property of cable, based on tensile - elongation and volume resistivity testing. The cured foam is an inert solid that does not affect cable components.

Chemical Resistance

FST™ Sealant is chemically resistant to gasoline, oils, dilute acids and bases, and most unsaturated hydrocarbons.

Environmental Resistance:

FST™ Sealant withstands the rigors of the conduit exposure environment.

Cured Sealant Temperature Use Range
-20° F to 200° F (-29° C to 93° C) Continuous
-40° F to 250° F (-40° C to 121° C) Peak

FST™ Sealant does not lose function in direct sunlight. Reacted foam that is exposed to uv will yellow. This discoloration does not affect performance, the foam seal retains its hardness and continues to act as a duct block.

The foam sealant can be protected with a weather proofing paint. Both urethane and epoxy based products have been tested with good results and excellent adhesion to the foam.

Application:

Field-Ready Kit
The FST™ Sealant kit includes all materials required to install a finished duct block.

Seal Length
It is most important to make a seal of adequate length by using and properly spacing the damming strips. A 3-inch plug will meet performance guidelines.

Application Temperature
Working temperature for Polywater® FST™ Sealant is 35° F to 95° F (2° C to 35°C).

Water in Duct
FST™ Sealant will cure and seal duct with small amounts of water present. The water should not be flowing, and should be relatively clean. The FST™ foam will incorporate water into its cure. However, excessive water will weaken the seal.

For full installation information, please see the FST™ Installation Instructions.
(www.polywater.com/FSTuse.pdf)

Cure Rate:

The FST™ Sealant can be used in temperatures down to 35° F (2° C). At low temperatures, the reaction is slow, but the sealant will completely foam and cure with time. At cold temperatures, the sealant components become more viscous and flow through the mixing nozzle at a slower rate. Cure times are as follows:

	Reaction Time (Minutes)	
	40° F (4° C)	70° F (21° C)
Foaming, Expansion Complete	8 - 9	4 – 5
Hard, Non-sticky Skin Formation	15 – 18	7 – 9

Once a skin has formed, the foam may be visually inspected to determine whether the seal has completely filled the void. After the sealant has cured, the positioning rod or a screwdriver can be used to check for voids in the finished seal.

To decrease cure time in cold temperatures, warm FST™ Sealant cartridges prior to use.

Clean-up

Any unreacted material may be cleaned from surfaces with a solvent wipe such as Polywater's Type HP™ Cleaner/Degreaser. The part A amber resin will react with water if surfaces are washed with a soap and water solution. Once reacted, the foam has strong adhesion, and may be scraped or cut from surface.

Removal:

FST™ Sealant can be mechanically removed with some effort. Use a long screwdriver to puncture holes throughout the seal. With a hammer, punch the screwdriver through the foam, twist it to enlarge the cavity, and pull out. Once the foam is weakened, it can be chipped away, and the cable should break free.

Safety:

FST™ Sealant is a two-part urethane foam containing reactive chemicals. Polyurethanes are common in the construction industry and have been used for many years. Some individuals may become sensitized to components in the unreacted resin. Precautions must be observed during use and handling of these materials.

The use of FST™ in the prepackaged cartridge controls and reduces exposure. Once reacted, the foam is solid, closed-cell polyurethane. The finished product may be considered non-toxic. See MSDS for more information.

Combustion of Cured Foam
Irritating and toxic smoke and vapors may form during combustion of cured FST™ Foam Sealant. If burning the sealant material cannot be avoided, provide appropriate ventilation/respiratory protection against decomposition products during flame cutting operations.

Storage and Handling:

Keep containers cool, dry and away from sunlight. Leave cartridges in the protective foil pouch until ready to use/reuse.

Product shelf life is one year. Shelf life is one month after the product is opened.

Model Specification:

The statement below may be inserted into a customer specification to help maintain engineering standards and ensure work integrity.

The foam duct sealant shall be FST™ Sealant. The foam duct sealant shall be a two-part "blown" urethane foam with 98% closed cell content. The foam duct sealant shall have a compressive strength of 300 pounds (ASTM D1691), and shall have a tensile strength of 250 pounds (ASTM D1623). The foam duct sealant shall have a flexural strength of 450 pounds (ASTM D790), and shall withstand temperatures from -20° F to 200° F. The foam duct sealant shall be chemically resistant to gasoline, oils, dilute acids and bases.

The foam duct sealant shall be available as a kit suitable for sealing various sized ducts. The product shall foam and react in five to ten minutes at 70° F.

When installed, the sealant shall be capable of holding 10 psi water pressure continuously (equivalent of 22 feet water-head pressure).

Order Information:

Cat #	Package Description
FST-250 (12 units/case)	8½-oz two-part Foam Sealant caulking tube style with resealing cap 1 ea Static mixing nozzle
FST-250KIT1 (1 unit/case)	8½-oz two-part Foam Sealant caulking tube style with resealing cap 3 ea Static mixing nozzles
FST-250KIT (6 units/case)	4 ea 24-inch Foam damming strips 1 24-inch Abrasive strip 1 pair Disposable gloves 1 Position rod 1 Pre-treating wipe 1 Instruction sheet
TOOL-250 (1 unit/case)	Ratchet application tool for FST-250
MXR-30T-10 (1 unit/case)	Mixing nozzle 10-pack (for FST-250)
FST-MINI-1 (1 unit/case)	50-ml two-part Foam Sealant, dual cartridge with resealing cap 3 ea Static mixing nozzles
FST-MINI-B6 (6 units/case)	6 ea Foam plugs 1 pair Disposable gloves 1 Instruction sheet
TOOL-50-11 (1 unit/case)	Dispensing tool for 50-ml cartridge, FST-MINI
FST-DAM (24 units/case)	24-inch Foam damming strip

***Custom kits available. Call factory for details.*

Quantity Calculator located online:
http://www.polywater.com/calculators/fstcalculator.asp

Makers of Polywater® and Dyna-Blue® Cable Lubricants and Pull-Planner™ Software

American Polywater® Corporation

11222 60th St. N
Stillwater, MN 55082
U.S.A
1-800-328-9384
1-651-430-2270
http://www.polywater.com (URL) support@polywater.com (e-mail)

Polywater® FST™ MINI

FOAM DUCT SEALANT MULTI-USE CARTRIDGE

UL Recognized Component

FST™ closed-cell foam was engineered for harsh construction environments.

- Excellent for Use in 3/4” to 2” Conduits
- Seals Out Water, Sewer Gases, and Rodents From Conduits
- Reenterable
- Holds Over 22’ of Water Head Pressure
- Seals Multiple Conduits
- Compatible with Cables and Conduits
- Complies with TIA-758-B Standard 5.1.1.2.8, 5.4.2.3 and 7.4.2.8.1
- Complies U.S.A. NEC Sections 225.27, 230.8, 300.5 (G), 300.7 (A), and 501.15 (B)(2) on Conduit and Raceway Seals.

Actual cross section of cured FST™ closed-cell foam.

Open-Cell Canned Foams & Duct Putty

- Do Not Hold Water-Head Pressure
- Do Not Fully Cure in Conduits
- Sag and Dry Out Over Time

Polywater® FST™ MINI Duct Seal/Water Block Foam Kit

UL Recognized Component

Polywater® FST™ Foam Duct Sealant meets and exceeds the NEC code requirements for sealing conduits. Polywater® FST™ is superior to both duct putty and aerosol cans of foam because it has been tested for cable compatibility; holds 22 feet of water head pressure continuously and up to 90 feet intermittently; prevents the passage of gas; does not sag; will not dry out; and is re-enterable. FST™ sealant is chemically resistant to gasoline, oils, dilute acids and bases, and most unsaturated hydrocarbons. Review our technical bulletin to see our extensive ASTM product testing.

FST™ meets the following from the NFPA 70® National Electrical Code® 2008, 2011 Editions:

NEC 225.27 Raceway Seal. Where a raceway enters a building or structure from an underground distribution system, it shall be sealed in accordance with 300.5(G). Spare or unused raceways shall also be sealed. Sealants shall be identified for use with the cable insulation, shield, or other components.

NEC 230.8 Raceway Seal. Where a service raceway enters a building or structure from an underground distribution system, it shall be sealed in accordance with 300.5(G). Spare or unused raceways shall also be sealed. Sealants shall be identified for use with the cable insulation, shield, or other components.

NEC 300.5(G) Raceway Seals. Conduits or raceways through which moisture may contact live parts shall be sealed or plugged at either or both ends.

Informational Note: Presence of hazardous gases or vapors may also necessitate sealing of underground conduits or raceways entering buildings.

NEC 300.7 (A) Sealing. Where portions of a cable raceway or sleeve are known to be subjected to different temperatures and where condensation is known to be a problem, as in cold storage areas of buildings or where passing from the interior to the exterior of a building the raceway or sleeve shall be filled with an approved material to prevent the circulation of warm air to a colder section of the raceway or sleeve. An explosion proof seal shall not be required for this purpose.

NEC 501.15 (B)(2) Conduit Seals, Class 1 Division 2: A conduit seal shall be required in each conduit run leaving a Class 1, Division 2 location... and it shall be designed and installed to minimize the amount of gas or vapor within the portion of the conduit installed in the Division 2 location... Such seals shall not be required to be explosion proof..."

** As always with the NEC code it is prudent to check with and get approval from the AHJ before installing any product in a hazardous location area due to varying interpretations*

Polywater® FST™ Product #	Description	Units/Case
FST-MINI-1	50-mL cartridge – 1 Mixing nozzles – 2 Foam discs – 6 Pair of disposable gloves – 2 Instruction sheet – 1	1
FST-MINI-1G	Same as kit above *Includes TOOL-50-11*	1
FST-MINI-B6	6 FST-MINI-1	1
FST-MINI-B6G	6 FST-MINI-1 *Includes TOOL-50-11*	1
TOOL-50-11	Dispensing Tool for FST-MINI	1
MXR-20T-10	Mixing nozzle 10-PACK for FST-MINI	1

To view technical information on our website go to:
Support Page: **www.polywater.com/ductseal.html**
Application Videos: **www.polywater.com/videos.asp**

American Polywater® Corporation

phone: 1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
email: support@polywater.com
11222 60th Street North, Stillwater, MN 55082, U.S.A.

ADHESIVES | CLEANERS | LUBRICANTS | **SEALANTS** WWW.POLYWATER.COM

American Polywater® Corporation

ZipSeal™

Duct Sealant

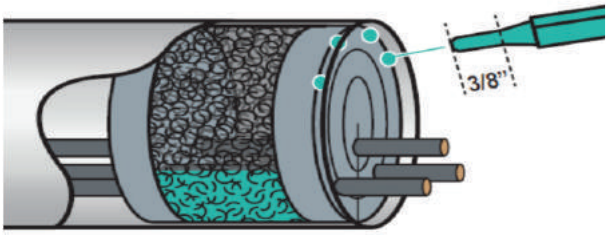
- Seals out Water, Sewer Gases, and Rodents From Conduits
- Installs in 45 Seconds
- Easy to Re-Enter
- Holds up to 10’ of Water-Head Pressure
- One Kit Seals Six 2” (50mm) Conduits
- Compatible with Cables and Conduits
- Complies with TIA-758-B Standard 5.1.1.2.8, 5.4.2.3 and 7.4.2.8.1 Sealing Ducts

Open-Celled Canned Foams & Duct Putty

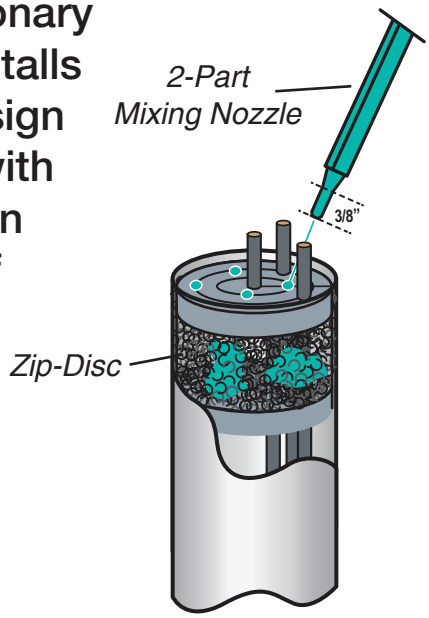
- Do Not Hold Water-Head Pressure
- Do Not Fully Cure in Conduits
- Sag and Dry Out Over Time

Polywater® ZipSeal™ Duct Sealant

ZipSeal™ Duct Sealant is a practical and efficient way to seal innerducts and conduits. The revolutionary Zip-Disc insert and unique two-part foam installs quickly and effectively. This innovative design allows for horizontal and vertical installation with minimal drippage. The foam can be removed in just minutes. ZipSeal™ can hold up to 10 feet of water-head pressure.



Horizontal application



Vertical application

Cat. No.	Package Components	Case Qty
ZIP-50KIT1	1 50mL two-part foam sealant cartridge w/ resealing cap, 2 static mixing nozzles, 2 pairs disposable gloves 5 2" Zip-Discs	1
ZIP-50KIT1G	ZIP-50KIT1 w/ dispensing tool	1
ZIP-KITB6	6 ZIP-50KIT1	6
TOOL-50-11	Dispensing tool	1
MXR-20T-10	Mixing nozzles	10

To view technical information on our website, go to

www.polywater.com/zipseal.html

For application videos

www.polywater.com/videos.asp

American Polywater® Corporation

phone: 1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
email: support@polywater.com
11222 60th Street North, Stillwater, MN 55082, U.S.A.

ADHESIVES | CLEANERS | LUBRICANTS | **SEALANTS** WWW.POLYWATER.COM

American Polywater

powerpatch®

Leak Repair System For:

- Transformers
- Potheads
- SF_6 Gas
- Oil-Filled Equipment
- Lead-Sheathed Cables
- Pipe Type Cables

NEW Multi-Use Cartridge.

Solves Complicated Leaks

Use on PILC Cable

Substation Applications

In-Field Repairs

Features

- **Quick plugging action:** A fast-cure putty that stops oil seepage.
- **Permanent seal:** A 2-part paste overcoat forms a permanent seal.
- **Durable:** Finished seal is impervious to water, oil and weather.
- **Fast:** System can plug and seal active leaks in minutes.
- **Saves money:** Faster than welding. Transformer may stay in service.
- **Simple:** Eliminates “bagging” or removal from field and unexpected outages.
- **Convenient:** Kit contains all materials needed to fix leak while in the field.

PowerPatch® System

- PowerPatch® System's 2-part putty stick blocks oil leaks and the 2-part paste overcoat creates a permanent patch. It is resistant to UV, water, and oil. It also adheres to a wide range of metals, painted steel, ceramic, and composite materials.
- PowerPatch® Sealant seals punctures or cracks in hard to reach areas. Optimal mix and performance is ensured with pre-measured packaging. It is easy to use and fixes leaks fast. At 70° F, the putty and sealant harden in about 10 minutes. Repairs made at temperature as low as 40° F, have a somewhat slower cure.
- PowerPatch® Seal is resistant to transformer oil and sulfur hexafluoride gas (SF6), and has held oil pressures in excess of 100 psi. It is non-conductive and has a dielectric strength of 43 KV (ASTM D149).

PRIMER AVAILABLE FOR POLYETHYLENE APPLICATIONS

PowerPatch® Kit

The PowerPatch® Sealant is provided in a kit containing the surface preparation and patching materials necessary to repair oil leaks in transformers, lead-sheathed cables, potheads and other oil-filled electrical equipment. Kits can be customized to end-user requirements.

Product Code	Description
EPCT-KIT1	Contains: Two PowerPatch® 2-Part Cartridges with 4 static mixers, 2 putty sticks (1-3/4"), 8 Type RP™ cleaning and preparation wipes, 24" sandpaper strip, 4 application sticks, and instructions. Multi-use kit. TOOL-50-11 must be purchased separately to dispense the PowerPatch® sealant.
EPCT-KIT1G	Contains: Same as EPCT-KIT1 with application tool TOOL-50-11
EPCT-KITB6	Contains: 6 EPCT-KIT1
EPCT-KITB6G	Contains: 6 EPCT-KIT1 with application tool TOOL-50-11
TOOL-50-11	Contains: 1 Application tool to dispense cartridge packages
EP-KIT11	Contains: 2-part sealant (part A & B), putty stick (~2"), 2 RP™ cleaning and preparation wipes, 12" sandpaper strip, 2 mixing sticks, 1 pair of gloves, and instructions. Single use.

Related website (www.polywater.com) links:

Application slide show: www.polywater.com/EPApplication.asp

Product benefits slide show: www.polywater.com/EPPresentation.asp

Technical data sheet: www.polywater.com/EPSpec.pdf

American Polywater® Corporation

phone: 1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
email: support@polywater.com
11222 60th St. N., Stillwater, MN 55082, U.S.A

American Polywater

powerpatch®

Leak Repair System
For
PILC (Paper Insulated Lead Cables)

Before

After

Features

Eliminate Hazardous Alternative Methods - Kit will eliminate lead wiping and heat sources in manhole.

Convenient - Kit contains all materials needed to fix leak while in the field.

Quick plugging action - Fast cure putty stops oil seepage.

Permanent seal - A quick curing 2-part paste overcoat forms a permanent seal.

Durable - Finished seal is impervious to water, oil and weather.

Fast - System can plug and seal active leaks in minutes.

PowerPatch® System

System contains necessary cable prep material for cleaning and sealing of cable. Use the PowerPatch® System's 2-part putty stick to block oil leaks. Then make a permanent patch with the fast cure, 2-part paste overcoat. Optimal mix and performance is ensured with pre-measured packaging.

Seals cracks and punctures in hard to reach areas. Fixes leaks fast. At 70°F, the putty and sealant harden in about 10 minutes. Repairs made at temperatures as low as 40° F have a slower cure. The finished patch is resistant to transformer oil and water and has held oil pressures in excess of 20 psi on lead.

Preparation is important, and the kit approach provides everything needed to do the job. Read detailed application instructions before using.

PowerPatch® Sealant Physical Properties

Color: Dark Grey
Viscosity: No-Sag, Thick Paste
Pot Life: 5 minutes @ 70°F/ 21°C
Dielectric Strength: 41 KV (ASTM D 149)
Cured Hardness: 75 (Shore D)
Durability: Resistant to UV, water, and oil
Adhesion to Metals: Good
Adhesion to Ceramic: Excellent

PowerPatch® Kit

The PowerPatch® Sealant is provided in a kit containing the preparation and patching materials necessary to repair oil leaks in transformers, lead-sheathed cables, potheads and other oil-filled, electrical equipment. Kits can be customized to end-user requirements.

Product Code	Description
EP-Kit11	**Contains**: 2 Part Sealant (Part A & B), Putty Stick (3-1/2"), 2 RP™ Cleaning and Preparation Wipes, 24" Sandpaper Strip, 2 Mixing Sticks, 1 Pair of Gloves, and Instructions. Single Use.
EP-Kit51	**Contains:** 6 sets 2 part Sealant (Part A&B), Putty Stick (7"), 12 RP™ Cleaning and Preparation Wipes, 6 Strips Sandpaper (24"), 12 Mixing Sticks, 6 Pairs of Gloves, and Instructions. Seals multiple leaks.
EP-KITB12	**Contains:** Twelve sealed plastic bags, each with 2-part sealant (part A & B), putty stick (~2"), 2 Type RP™ Cleaning and Preparation Wipes, 12' sandpaper strip, 2 mixing sticks,1 pair gloves, and instructions. Box of 12 Single-use kits
EP-KIT51	**Contains:** 6 sets 2 part Sealant (Part A & B), Putty Stick (~7"), 12 RP™ Cleaning and Preparation Wipes, 6 Strips Sandpaper (24"), 12 Mixing Sticks, 6 Pairs of Gloves, and Instructions. Seals multiple leaks.

LIT-POWERPATPILC/REV000

American Polywater® Corporation

11222 60th St. N.
Stillwater, MN
55082 U.S.A

support@polywater.com (e-mail)
http://www.polywater.com(URL)

1-800-328-9384
1-651-430-2270
fax 1-651-430-3634

powerpatch®

Leak Repair

American Polywater® Corporation

TECHNICAL DATA SHEET

Description:

The PowerPatch® Leak Repair System provides fast and effective “in-field” leak repair for transformers, PILC cables, and other oil and gas insulated electrical equipment.

Once a leak has been temporarily stopped using the two-part Putty, the Sealant is applied and cures to form a strong, durable patch. The PowerPatch® Sealant is the functioning patching material.

PowerPatch® System is supplied with all the materials required to seal electrical insulating oil and gas leaks. The sealant bonds to polyethylene, lead, aluminum, ceramic and steel.

Leak Sealing Performance:

To test gas pressure sealing, a 1/16-inch hole was patched. The surface was prepared and sealant applied and cured according to the instructions. The repair was then subjected to continuous air pressure for 24 hours.

Surface	Pressure	Result
Steel	200 psi	No Leaking
HDPE (cable jacket)	80 psi	No Leaking
Lead	50 psi	No Leaking

To evaluate oil leak sealing, a seeping oil leak from a 1/8-inch hole in a galvanized pipe was repaired using standard procedures. The oil pressure in the pipe was then increased and held at 100 psi.

Continuous Pressure	One Month Aging With Polybutene Oil
100 psi	No Leaking

PowerPatch® Sealant shows good adhesion and no leakage under high pressure with both air and polybutene oil.

The PowerPatch® Leak Repair System provides a fast and easy in-field leak repair system.

Product Benefits:

- Quick plugging action
- Easy to use, fast repair time
- Long-lasting seal
- Durable- withstands environmental extremes
- Resistant to oils, water, and uv
- Prevents water entry into oil-filled equipment
- No bagging necessary to catch oil
- Convenient, field-ready kit

Typical Applications:

PowerPatch® Sealant repairs oil and SF_6 filled systems and restores electrical integrity to:

- Transformers
- Switchgear
- Terminations
- PILC Cables

Component Physical Properties:

PowerPatch® is a 2-part sealant, ready to mix for field use.

Property	Part A (Resin)	Part B (Curing Agent)
Color	Black	White
Form: *Cups*	Thick Paste	Thick Paste
Cartridge	Thick Gel	Thick Gel
VOC Content	0 g/L	0 g/L
Specific Gravity	1.7	1.4

Cured Properties:

PowerPatch® Sealant cures to form a solid patch. Pre-measured packaging contains enough material to seal one typical leak, ~ 6 in^2 at ¼-inch thickness.

Property	Typical Result
Color	Dark Grey
Peak Exotherm @ 70° F	< 200°F
Hardness 7 Days @ 70° F (Shore D Durometer)	75
Flexural Stress (ASTM D790)	6,925 lb_f/in^2
Flexural Strain (ASTM D790)	1.43 X 10^{-2} in/in

Typical Peel Strength:

Substrate	Result
Galvanized Steel (180°)	>100 pli
Aluminum (180°)	>100 pli
Lead (180°)	16.5 pli
Copper (180°)	>100 pli
Stainless Steel (180°)	>100 pli
HDPE (90°)	49 pli
PVC (90°)	46 pli
Ceramic (90°)	> 100 pli

Tested using ASTM C794. Samples are sanded, cleaned and allowed to cure for 24 hours.

Typical Shear Strength:

Substrate	Result
Steel	> 1,000 lbs/in^2
Aluminum	> 1,000 lbs/in^2
Polyethylene	114 lbs/in^2
PVC	148 lbs/in^2

Tested using ASTM D1002. Samples are sanded, cleaned and allowed to cure for 24 hours.

Typical Impact Resistance:

Substrate	Result
HDPE	55 in-lbs
Lead	65 in-lbs
Steel	95 in-lbs

Tested using ASTM G14. Samples are sanded, cleaned and allowed to cure for 24 hours.

Electrical Testing:

PowerPatch® Sealant is non-conductive. Dielectric strength was tested using a 2,000 volts/second rate of rise and type 3 circular electrodes with a 0.25-inch diameter. All tests were performed in insulating oil to prevent discharges and flashovers. Results are the average of 10 trials.

Sample Thickness	Breakdown Voltage	Dielectric Strength
0.0916 Inch	43 kV	469 Volts/Mil

Tested using ASTM D149, Method A. Platen samples are cast and fully cured.

Chemical Resistance:

PowerPatch® Sealant chemically resists dielectric fluids, SF_6 gas, ultraviolet light, water, and oil.

ASTM D1002 was used to test the shear adhesive strength of the PowerPatch® Sealant on steel after exposure to the reagent. The sample was allowed to cure 7 days, then was immersed in the reagent and aged at 50°C for 6 months. Shear adhesion was compared to a control that was air aged.

Fluid*	Appearance (6 months)	Comparison to Control
Mineral Oil	No Change	100% (Pass)
Polybutene Fluid	No Change	100% (Pass)
Hydrocarbon Fluid	No Change	100% (Pass)
Silicone Oil	No Change	100% (Pass)

**Mineral Oil (Holland 70), Polybutene (Duddek PLIC), Hydrocarbon Fluid (Bio Temp), Silicone Oil (GE Silicone SF 96-100)*

Application:

PowerPatch® Sealant is easy to use. For full installation information, please see PowerPatch® Instructions: Cartridge Application or Mixing Cup Use. *(See www.polywater.com/powerpatch.asp)*

In cold weather, materials should be kept as warm as possible. Store materials in a warm vehicle and use chemical warming pad to increase the temperature of the repair area.

Cure Rate:

Recommended application temperature is 40° F to 120° F. Cure rate depends on temperature.

Temperature	Working Time	Functional Cure
35° F	40 Minutes	7 Hours
52° F	20 Minutes	3½ Hours
60° F	10 Minutes	1½ Hours
70° F	6 Minutes	60 Minutes
88° F	4 Minutes	40 Minutes

PowerPatch® Sealant is available in a slower-cure rate for larger applications that require more work time. (Product Code EPSC)

An oil pressure test was used to determine effective seal time under ambient conditions.

Aging Condition	Result
Ambient (70° F)	Holds 20 psi oil pressure after 15 minutes

Seal sets in less than 10 minutes at this temp.

Vertical Sag:

PowerPatch® Sealant clings to vertical surfaces and other non-horizontal angles common in field repairs. Once applied, it stays in place.

In this test, the PowerPatch® Sealant is mixed and applied to a vertical metal platen. Displacement is measured and recorded.

Temperature	Displacement from Center
60°F	0 inches
75°F	1/16 inch
95°F	3/32 inch
110°F	3/16 inch

PowerPatch® Paste shows minimal sag within a large temperature range.

Paint Adherence:

PowerPatch® Sealant can be painted 15 minutes after application. In this test, the paste is applied, painted and the paint is allowed to dry for 24 hrs. Then, a cross-cut tape test is run.

Paint Type	Results
Enamel Paint	0% Paint Removed
Alkyd Paint	0% Paint Removed

Tested using ASTM D3359, Test Method B.

Both paints adhere well to the PowerPatch® Sealant.

Environmental Resistance:

Temperature Range:

Application: 40° F to 120° F
In Use: -40°F to 400°F

Temperature Cycle Testing:

Ten cycles at -22° F to 203° F showed no significant change in adhesion as shown below.

Material	Adhesion Compared to Non-Aged Control
Galvanized Steel	100 % (Pass)
Aluminum	100 % (Pass)
Ceramic	100 % (Pass)
Copper	100 % (Pass)
Stainless Steel	100 % (Pass)
Lead	100 % (Pass)

PowerPatch® Sealant is resistant to ultraviolet exposure and withstands direct sunlight with no decrease in functionality.

PowerPatch® Sealant has been outside aged for over five years with a temperature range from -25° F to 110° F. Conditions include rain, snow and sleet as well as exposure to direct sunlight. PowerPatch® shows no deterioration and cannot be physically pried from the surface. It shows only slight discoloration (<1/16" thickness).

Safety:

PowerPatch® Sealant has a low level of toxicity. Follow good industrial hygiene practice during use. Avoid vapor inhalation and personal contact with the product. Use ventilation or respiratory protection against decomposition products during welding/flame operations on or near cured product (e.g., torches used to install heat shrink products). See SDS for specific details.

Storage and Handling:

Keep containers cool, dry and away from sunlight. Keep containers tightly closed.

Product shelf life is 15 months.

Model Specification:

The statement below may be inserted into a customer specification to help maintain engineering standards and ensure work integrity.

Approved electrical repair compound is PowerPatch® Sealant. The electrical repair compound shall come in a system that contains everything needed for the repairs. The system shall contain an oil block to allow repairs on an active oil leak. The sealant shall not sag during cure so that it may be applied to the bottom side of leaking surfaces without running or dripping.

The adhesive repair patch shall have excellent adhesion to a variety of substrates with minimum peel strength of 100 pli on stainless steel, copper, and ceramic; and 40 pli on polyethylene when measured by ASTM C 794. The adhesive repair patch will retain 100% of peel strength adhesion after 5 freeze/thaw cycles and shall withstand in-use temperatures from -50°F to 250°F.

The adhesive repair patch shall seal mineral oil and polybutene dielectric fluid at up to 200 psi oil pressure without leakage. The cured repair patch shall be impervious to water, salt water, oils, and dilute acids and bases. It shall have a minimum flexural strain of 1.1 in/in as measured by ASTM D790.

The adhesive patch shall not contain any metals and shall not corrode. It shall be non-conductive with a minimum dielectric breakdown voltage of 40 kV as measured by ASTM D 149.

Order Information:

Cat #	Package Description
EPCT-KIT1 Multi-Use Cartridge Kit	2 PowerPatch® Sealant 2-part Cartridges 4 Static Mixers 2 Putty Sticks (1-3/4" ea) 8 Type RP Cleaning and Preparation Wipes 24" Strip Sanding Cloth 4 Application Sticks 1 Instruction sheet
EPCT-KIT1G	EPCT-KIT 1 with Application Tool
EPCT-KITB6	Contains: 6 EPCT-KIT1
EPCT-KITB6G	Contains: 6 EPCT-KIT1 with application tool TOOL-50-11
TOOL-50-11	Application Tool to dispense cartridge package, EPCT
EP-KIT11 Single-Use Kit	2-Part PowerPatch® Sealant(parts A and B) 1-3/4" Putty Stick 2 Type RP Cleaning and Preparation Wipes 12" Strip Sanding Cloth 2 Mixing Sticks 1 Pair disposable gloves 1 Instruction sheet
EP-KITB6	Box of 6 Single-Use Kits, EP-KIT11
EP-KITB12	Box of 12 Single-Use Kits, EP-KIT11
EP-KIT51	6 sets Part A and B PowerPatch® Sealant 7" Putty Stick 12 Type RP Cleaning and Preparation Wipes 6 24" Strips Sanding Cloth 12 Mixing Sticks 6 Pairs disposable gloves 1 Instruction sheet
***Custom kits available. Call factory for details.*	
***Slower curing version PowerPatch® Sealant available (EPSC). Call factory for details.*	

LIT-EPSPEC/REV001

Makers of Polywater® and Dyna-Blue® Cable Lubricants and Pull-Planner™ Software

American Polywater® Corporation

11222 60th St. N
Stillwater, MN 55082
U.S.A
1-800-328-9384
1-651-430-2270
http://www.polywater.com(URL) support@polywater.com(e-mail)

Polywater®

Pad N Pole™ Repair

HELPS STOP OUTAGES, AND EASILY REPAIRS
DAMAGE TO ENCLOSURES, PADS AND RISER POLES

The **Polywater® Pad N Pole™** fixes and restores damaged utility enclosures to prevent humans, water, pests or debris from entering through the affected area. Great for repairing damage due to lawn mowing equipment.

The Polywater® Pad N Pole™ two-part adhesive bonds to fiberglass, polyethylene, metal, concrete and composites. The customizable fiberglass cloth (saturated with the adhesive) provides structural integrity for a durable, long-lasting repair.

Polywater® Pad N Pole™ comes in a kit that contains everything needed for a repair. The adhesive is easy to dispense and quickly wets the fiberglass cloth. The fiberglass can be layered as necessary to create a thicker and stronger structure. Repairs are quick and easy, and can be done in the field in a single visit with little or no training. Repairs made with Pad N Pole™ withstand exposure to extreme outdoor temperatures, from -60° F to 200° F (-51° C to 93° C). Pad N Pole™ is versatile with optional use of single or multiple layers of fiberglass material. Additional layers are appropriate for increased strength over larger defects. A wide variety of defects can be repaired, from small cracks to holes up to six inches in diameter. The Pad N Pole™ mixed resin has 30 minutes of working time. It can be painted immediately after application, so no return visit is needed.

PRODUCT BENEFITS:

- Seals defects from unwanted entry
- Helps stop outages
- Easy to apply - quick repair
- Protects and seals enclosures/poles/risers
- Sunlight (UV) resistant
- Repairs various sized defects
- Multiple use, field-ready kit
- Complete field repair in a single visit

Catalog #	Description	Units/Case
BRK-KIT	Kit Contains: 1 PowerPatch® Pad N Pole™ Repair Adhesive Cartridge, 6 Mixing Nozzles, 1 Strip of Sanding Cloth, 1 Pair of Disposable Gloves, 6 HP™ Tandem Cleaning and Drying Wipes (HP-P158ID), 6 Foam Brushes, 1 Square Foot Patch Material, 1 Instruction Sheet *(Dispensing tool not included.)*	1
BRK-KITG*	Contains 1 BRK-KIT and 1 Dispensing Tool	1
BRK-KITB6	Bulk Kit Contains 6 Individual Kits, BRK-KIT *(Dispensing tool not included.)*	1
BRK-KITB6G*	Bulk Kit Contains 6 Individual Kits, BRK-KIT, and 1 Dispensing Tool Included	1
TOOL-50-21	1 Dispensing Tool	1

**Kits and tools sold separately for international shipments.*

PowerPatch® Pad N Pole™ Repair is easy to use.

1. If necessary, dig out sod and soil to reveal at least 2 inches (5 cm) of undamaged surface around the defect.

2. Abrade the area to be repaired approximately 1½ inches (3.8 cm) around the damage using the abrasive cloth included in the kit.

3. Clean and dry the abraded area with the Type HP™ Tandem Pack™ (HP-P158ID), removing all dirt and other contaminants. As in any repair involving adhesive application, starting with a clean surface is very important.

4. Cut the fiberglass cloth to overlap the damage by approximately 1 inch (2.5 cm) past its borders. Generously apply the two-part Pad N Pole™ adhesive to the cleaned surface around the damaged area.

5. Lay the fiberglass fabric over the damaged area, pressing the edges into the Pad N Pole™ adhesive. Smooth and press down with the foam brush. The patch will cling to the adhesive covered area and quickly saturate with the Pad N Pole™ adhesive.

6. Generously apply additional Pad N Pole™ adhesive to the top of the fiberglass cloth (including the cloth over the hole) and smooth with the brush until the cloth is fully saturated. Brush the Pad N Pole™ adhesive ½ inch (1.3 cm) past the edges of the cloth, feathering the resin and ensuring that the edges of the cloth are well adhered to the surface. Pad N Pole™ adhesive will set in about 30 minutes and reach full strength in about 12 hours.

7. Larger repairs (> 2") (>5 cm) will benefit by adding additional layers of cloth material. Additional layers can be added at any time, before or after the first layer has cured.

8. The repair area may be spray painted immediately (before full cure), and soil may be replaced at this time, enabling even a complex repair to be done in a single visit.

www.polywater.com/BRKinstructions.pdf

American Polywater® Corporation

phone: 1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
email: support@polywater.com
11222 60th Street North, Stillwater, MN 55082, U.S.A.

ADHESIVES | CLEANERS | LUBRICANTS | **SEALANTS** WWW.POLYWATER.COM

LIT-PADNPOLE/REV001

Pad N Pole™ Repair

TECHNICAL DATA SHEET

Description:

The PowerPatch® Pad N Pole™ Repair system repairs and restores damaged utility enclosures, preventing human, water, pest or debris entry through the repaired area.

The PowerPatch® Pad N Pole™ two-part adhesive bonds to fiberglass, polyethylene, metal, concrete and composites. Fiberglass cloth (saturated with the adhesive) provides structural integrity for a durable, long - lasting repair.

PowerPatch® Pad N Pole™ Repair comes in a kit that contains everything needed for a repair. The adhesive is easy to dispense and quickly wets the fiberglass cloth. The fiberglass can be layered as necessary to create a thicker and stronger structure. Repairs are quick and easy, and can be done in the field with a single visit with little or no training.

Performance:

Repairs made with PowerPatch® Pad N Pole™ Repair withstand exposure to extreme outdoor temperatures, from -60° F to 200° F.

PowerPatch® Pad N Pole™ Repair is versatile with optional use of single or multiple layers of fiberglass material. Multiple layers are appropriate for increased strength over larger defects. A wide variety of defects from small cracks to holes up to six inches in diameter can be repaired.

PowerPatch® Pad N Pole™ Repair is quick, and many defects can be repaired in as little as 3 minutes. The PowerPatch® Pad N Pole™ mixed resin has 30 minutes working time. It can be painted immediately after application, so no return visit is needed. Repairs reach full strength in 12 hours.

Fiberglass cloth saturated with the high-strength, two-part resin makes the permanent PowerPatch® Pad N Pole™ Repair.

Product Benefits:

- Seals defects from unwanted entry
- Easy to use - quick repair
- Protects and seals enclosure
- Sunlight (UV) resistant
- Withstands environmental extremes
- Multiple use, field-ready kit
- Complete field repair in a single visit

Typical Applications:

PowerPatch® Pad N Pole™ Repair may be used on a variety of outdoor enclosures including:

- Transformer Pads & Enclosures
- Lighting Pedestals
- Telecom Junction Enclosures
- Above Ground Conduits

Component Physical Properties:

The PowerPatch® Pad N Pole™ adhesive is a 2-part, thixotropic paste packaged in a cartridge applicator. The supplied mixing nozzles ensure proper mixing as the product is extruded from the cartridge.

Property	Part A (Resin)	Part B (Curing Agent)
Color	Beige	Amber
Form	Thick Paste 700,000 cps	Liquid 900 cps
Odor	No Odor	No Odor
Specific Gravity (water = 1)	0.96	1.21

Typical Properties:

PowerPatch® Pad N Pole™ adhesive cures to form a solid, durable seal.

Property	Typical Value
Color	Beige
Peak Exotherm @ 70º F	< 110º F
Hardness 7 Days @ 70º F (Shore A Durometer)	90
Flexibility 7 Days @ 70º F	Excellent
Tensile Strength (lap shear adhesion, Aluminum @ 77º F)	1400 lbs/in^2
Dielectric Strength (ASTM D149)	450 Volts/Mil
Peel Adhesion (ASTM D1876)	34.3 lbs/in
Impact Resistance (ASTM G 14): On Fiberglass	>100 in-lbs
On Galvanized Steel	>100 in-lbs
On Polyethylene	>100 in-lbs

Materials:

PowerPatch® Pad N Pole™ Repair adheres to:

- Fiberglass
- Steel
- Composites
- PVC
- Polyethylene
- Concrete
- Aluminum
- Copper

Environmental Resistance:

PowerPatch® Pad N Pole™ Repair withstands the typical rigors of an outdoor environment.

It shows no significant change in adhesion in temperature cycle testing (0° F/130° F for 10 cycles).

It shows no significant change in adhesion in 12 month exposure to sunlight (some darkening of color).

Chemical Resistance:

The chemical resistance of a stainless steel screen to fiberglass bond (with the Pad N Pole™ adhesive) was tested by comparing peel adhesion after reagent immersion to non-immersed adhesion. Samples were immersed in the reagent at 70° F for 3 months.

Chemical Exposure	Percent of Control
Salt Water (4%)	95%
Alkaline Soap Solution (pH = 12)	100%
Odorless Mineral Spirits	90%

The PowerPatch® Pad N Pole™ Repair shows good resistance to salt water, alkaline soap solutions and mineral spirits (paraffinic solvent).

Application:

PowerPatch® Pad N Pole™ Repair is easy to use.

If necessary, dig out sod and soil to reveal at least 2 inches of undamaged surface around the defect. Abrade the area to be repaired approximately 1½ inches around the damage using the abrasive cloth included in the kit. Clean and dry the abraded area with the Type HP™ Tandem Pack™ (HP-P158ID), removing all dirt and other contaminants. As in any repair involving adhesive application, starting with a clean surface is very important.

Cut the fiberglass cloth to overlap the damage by approximately 1 inch past its borders. Generously apply the two-part Pad N Pole™ adhesive to the cleaned surface around the damaged area. Lay the fiberglass fabric over the damaged area, pressing the edges into the Pad N Pole™ adhesive. Smooth and press down with the foam brush. The patch will cling to the adhesive covered area and quickly saturate with the Pad N Pole™ adhesive.

Generously apply additional Pad N Pole™ adhesive to the top of the fiberglass cloth (including the cloth over the hole) and smooth with the brush until the cloth is fully saturated. Brush the Pad N Pole™ adhesive ½ inch past the edges of the cloth, feathering the resin and ensuring that the edges of the cloth are well adhered to the surface. Pad N Pole™ adhesive will set in about 30 minutes and reach full strength in about 12 hours.

Larger repairs (> 2") will benefit by adding additional layers of cloth material. Additional layers can be added at any time, before or after the first layer has cured.

The repair area may be spray painted immediately (before full cure), and soil may be replaced at this time, enabling even a complex repair to be done in a single visit.

For additional installation information, please see the Pad N Pole™ usage instructions at:
www.polywater.com/BRKinstructions.pdf

Cure Rate:

PowerPatch® Pad N Pole™ adhesive has a working time of 30 minutes at 70° F, allowing ample time to perform repairs with care and precision. After thickening beyond the point that it can be spread, the product continues to cure, reaching maximum strength in 12 hours at 70° F.

Working and set time variation with temperature is shown below.

Temp.	Working Time	Set Time
40° F (4° C)	90 Minutes	24 Hours
52° F (11° C)	70 Minutes	20 Hours
60° F (16° C)	40 Minutes	16 Hours
70° F (21° C)	30 Minutes	12 Hours
88° F (31° C)	20 Minutes	8 Hours

Storage and Handling:

Keep cartridge tightly closed in a cool, dark, dry location. Reseal cartridge after use. All cartridges should be disposed of in an environmentally safe manner and in accordance with governmental regulations.

Unopened product has a shelf life of one year.

Safety:

PowerPatch® Pad N Pole™ Repair has a low level of toxicity. Use good industrial hygiene practice, and follow any precautions during use. Avoid personal contact with the uncured product. See SDS for specific details.

Model Specification:

The statement below may be inserted into a customer specification to help maintain engineering standards and ensure work integrity.

The approved enclosure repair system is PowerPatch® Pad N Pole™ Repair. The repair system shall come in a multiple-use kit that will provide the materials needed for the repair.

The packaging shall automatically mix and meter the two-part repair adhesive. The cure rate of the adhesive shall allow 30 minutes of working time (at 70° F) to apply and smooth the repair. The repair shall be spray paintable immediately after application with no reduction in ultimate strength. Product shall be suitable for use on various enclosure materials, including fiberglass, HDPE, concrete, steel, aluminum, and composites.

Once cured, the repair shall be watertight. The bond shall be strong enough to withstand an impact of over 100 in-lbs on fiberglass as measured by ASTM G14.

The cured product shall be resistant to water, salt water, oils and ultraviolet degradation. The cured bond shall withstand temperature extremes from -60° F to 200° F. It shall withstand multiple freeze-thaw cycles. The cured product shall be non-conductive with a minimum dielectric strength of 450 Volts/Mil as measured by ASTM D149.

Order Information:

Cat #	Package Description
BRK-KIT (1 unit/case)	Kit contains: 1 PowerPatch® Pad N Pole™ Repair Adhesive Cartridge 6 Mixing Nozzles 1 Strip of Sanding Cloth 1 Pair Disposable gloves 6 HP™ Tandem Cleaning and Drying Wipes (HP-P158ID) 6 Foam Brushes 1 Square Foot Patch Material 1 Instruction Sheet (Dispensing tool not included.)
BRK-KITG (1 unit/case)	Contains 1 BRK-KIT and 1 Dispensing Tool
BRK-KITB6 (1 unit/case)	Bulk kit contains 6 Individual Kits, BRK-KIT (Dispensing tool not included.)
BRK-KITB6G (1 unit/case)	Bulk kit contains 6 Individual Kits, BRK-KIT 1 Dispensing Tool Included
TOOL-50-21 (1 unit/case)	1 Dispensing Tool

Makers of Polywater® and Dyna-Blue® Cable Lubricants and Pull-Planner™ Software

American Polywater® Corporation

11222 60th St N
Stillwater, MN 55082
U.S.A
1-800-328-9384
1-651-430-2270
fax 1-651-430-3634

http://www.polywater.com (URL)
support@polywater.com (e-mail)

Polywater® InstaGrout™

Sealant Barrier for Transformer Pad Openings

Polywater® InstaGrout™ Sealant, based on advanced Polymer Matrix Technology (PMT), creates a strong, resilient barrier to protect transformer pads, J–Boxes, DOT control cabinets, and other protective enclosures. InstaGrout™ creates a resilient, impermeable barrier in enclosure base openings to help prevent service disruptions and safety hazards. The hardened, lightweight InstaGrout™ seal safeguards expensive equipment and cabling from damage by pests such as rodents, snakes, spiders, wasps, and fire ants.

InstaGrout™ is easy to apply. Its self-leveling flow allows it to seal around stub-ups and expand into hard to reach areas under heavy equipment or cables. The hardened PMT base creates a strong cross-linked matrix that will not crumble or collapse. InstaGrout™ is a sturdy and economical alternative to concrete grout and; it doesn't need water.

- **Safeguard enclosures, equipment and cables from damage**
- **Prevent animal intrusions into protective enclosures**
- **Economical, robust alternative to concrete grout**
- **Protect hard to access areas and equipment**
- **Easy to mix and apply; no water required**
- **Compatible with all cable jacket materials**
- **Withstands temperature extremes**

Before...

Massive earthen build-up in the transformer

Sticks brought into transformer through visible rodent hole next to conduit

Close-up of rat bite marks on elbows

DOT traffic cabinet

After

Polywater® InstaGrout™ Sealant Barrier makes sealing pad and pedestal openings simple.

Polywater® InstaGrout™

Polywater® InstaGrout™ Sealant is a two-part system packaged in pre-measured quantities for easy, on-site mixing. The repair compound flows and expands around complex conduit stub-ups. It adheres to metals, plastics, wood, and concrete. InstaGrout™ self-levels and covers uneven dirt and sand base material. The result is a continuous barrier created from a convenient liquid system. It naturally expands to a thickness of 3 to 4 inches. Kit coverage is calculated using a 3-inch fill depth (7,60 cm). Working temperature range is from 35° F to 110° F (4° C to 43° C).

Carefully measure the area to be sealed by multiplying the width (in feet) by the length (in feet)* of the opening pad in the structure. Do not subtract any conduits or other stub-up utilities. Use this measurement to estimate the minimum quantity required. Round up to determine quantity of InstaGrout™ Sealant required. It is good practice to rely on field measurements to calculate quantity, rather than measurements from plans or specs. Actual pad opening dimensions may vary from drawings due to manufacturing variances or earlier pad change-outs.

Example: Pull box measuring 15 inches (38 cm) by 36 inches (91, 5 cm).

- *Pull box area is 3.75 ft. (3.477 cm).*
- *Seal requires one PMT-3 KIT and one PMT-1 KIT to cover 4 ft.2 at 3-inch depth (3.700 cm2 at 7, 6 depth). The additional PMT-1 will fill any holes or gaps left after the application of the PMT-3 Kit.*

*1 foot = 30,5 cm

Catalog No.	Area Covered	Volume Filled
PMT-1	1 ft^2 at 3-in. depth (929 cm^2 at 7,60 cm depth)	0.25 ft^3 (7.079 cm^3)
PMT-3	3 ft^2 at 3-in. depth (2.787 cm^2 at 7,60 cm depth)	0.75 ft^3 (21.237 cm^3)
PMT-10	10 ft^2 at 3-in. depth (9.290 cm^2 at 7,60 cm depth)	2.50 ft^3 (70.792 cm^3)

Catalog No.	Description	Units/Case
PMT-1	This kit will cover 1 square foot (approx.) with a 3-inch depth. Contains: 1 Bottle Part A, 1 Bottle Part B, 1 Pair Gloves, 1Instruction Sheet	2/Case
PMT-3	This kit will cover 3 square feet (approx.) with a 3-inch depth. Contains: 1 Bottle Part A, 1 Bottle Part B, 1 Pair Gloves, 1 Mixing Pail,1 Mixing Stick, 1 Instruction Sheet	1 Each
PMT-10	This kit will cover 10 square feet (approx.) with a 3-inch depth. Contains: 1 Jug of Part A, 1 Jug of Part B, 1 Pair Gloves, 1 Mixing Pail, 1 Instruction sheet. (recommend using paint mixer with drill to mix product thoroughly)	1 Each

To view technical information on our website go to:
Support Page: www.polywater.com/instagrout.asp
Lubricant Application Videos: www.polywater.com/videos.asp

American Polywater® Corporation
phone: 1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
email: support@polywater.com
11222 60th St. N., Stillwater, MN 55082, U.S.A

LIT-INSTAGROUTFLYER/REV001

InstaGrout™ Sealant

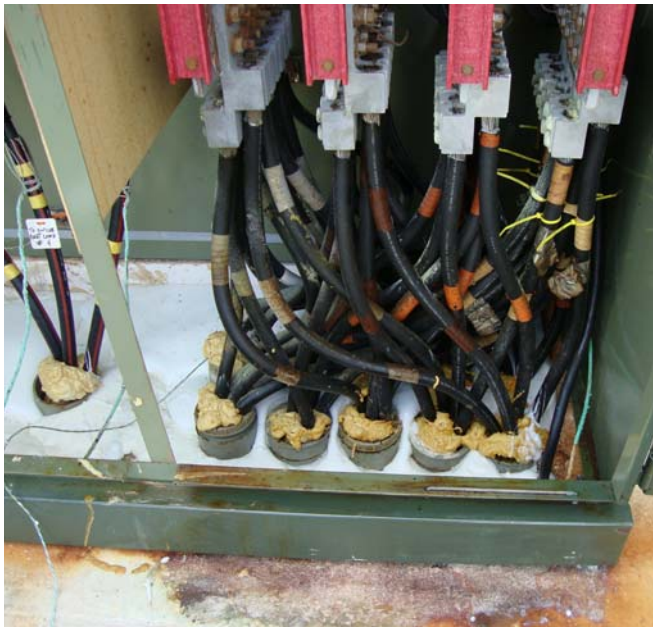
American Polywater® Corporation

TECHNICAL DATA SHEET

Description:

Polywater® InstaGrout™ Sealant creates a barrier to protect transformer pads, J boxes, control cabinets, and switchgear base openings. Polywater® InstaGrout™ keeps out moisture and stops rodents, snakes, spiders and insects such as wasps and fire ants from burrowing up through earthen gaps into the pad enclosure, potentially causing costly outages or safety hazards to crews. The strong, lightweight seal withstands freeze-thaw cycles and environmental extremes. It is compatible with cable jacket materials and will not corrode metal.

InstaGrout™ Sealant is packaged in pre-measured kits for easy, on-site mixing. It flows around cables, conduits and other complex geometry. InstaGrout™ Sealant adheres to metals, plastics, wood and concrete, creating a permanent, but re-enterable barrier.



InstaGrout™ Sealant is used to fill a transformer cabinet base in place of concrete.

Self Leveling Application:

InstaGrout™ Sealant is easy to install because it flows into the target area before expanding.

InstaGrout™ is mixed and poured

InstaGrout™ fills in irregularities of the surface on which it is applied and finds its way between the maze of conduits and cables that complicate the application of grouts and other systems.

It flows and expands after 20 minutes

InstaGrout™ is engineered with a time delay that allows this flow before it expands and reacts into its final, durable form. It will naturally flow into small spaces and does not require troweling.

Product Benefits:

- Keeps out rodents, snakes and insects
- Creates a strong, resilient, lightweight seal
- Self levels and flows before expanding.
- Easy to mix and apply; *no water required*
- Tolerates environmental extremes
- Sturdy, cross-linked structure will not crumble or cave-in like concrete grout
- Compatible with cable jacket materials

End Use:

InstaGrout™ Sealant creates a strong base that can:

- Be used for minor repairs or large areas
- Fill and block openings and channels
- Level transformer bases

Component Properties:

Polywater® InstaGrout™ Sealant is a two-part, reactive system. It is a slightly gelled liquid for use with manual mixing.

Property	Part A (Resin)	Part B (Curing Agent)
Color	Brown	Gray
Form	Viscous Liquid 300 cps	Viscous Liquid 1,100 cps
Specific Gravity	1.24	1.07
VOC Content:	0 g/L	0 g/L

Cured Properties:

Polywater® InstaGrout™ Sealant cures to form a solid, closed cell matrix.

Property	Typical Result
Appearance	Light gray with small, even cells
Closed Cell Content	98%
Density	8 lbs/cu. ft.
Compressive Strength (ASTM D1691)	615 psi
Seal Strength Water	1 foot continuous,
Seal Strength Air	1 psi
Dielectric Value (ASTM D149)	61 V/mil

Material Compatibility

Polywater® InstaGrout™ Sealant is compatible with cable jacket materials. The foam is an inert solid that will not attack the jacket material.

Chemical Resistance

Polywater® InstaGrout™ Sealant is chemically resistant to gasoline, oils, dilute acids and bases, and most unsaturated hydrocarbons.

Adhesion:

Polywater® InstaGrout™ Sealant has good adhesion to a variety of materials found in control cabinets.

InstaGrout™ Sealant is cured around a one-inch bar at a depth of 1.5 inches. Force required to remove bar is measured. Adhesion is calculated based on seal surface area.

Material	Adhesion	Value
PVC	Excellent	100 lbs/ sq. in
Copper	Excellent	90 lbs/ sq. in
Aluminum	Excellent	95 lbs/ sq. in
HDPE	Good	25 lbs/ sq. in

Water Resistance:

Polywater® InstaGrout™ Sealant does not absorb water. To test water blocking performance, InstaGrout™ is installed into a PVC conduit, forming a 3-inch plug. Water is added to the system, and then pressurized to create a “water-head”.

Condition	Result
PVC Conduit	Holds 10 psi, 7 days (22.5 feet water)

InstaGrout™ Sealant will keep water out if it is properly installed with good seal at all the edges.

Environmental Resistance:

Polywater® InstaGrout™ Sealant withstands the rigors of the environment.

Temperature Use Range
-20°F to 200°F (-29°C to 93°C) Continuous
-40°F to 250°F (-40°C to 121°C) Peak

Polywater® InstaGrout™ Sealant withstands direct sunlight with no decrease in functionality. Surfaces exposed to UV will discolor and yellow. The cured product retains its hardness and continues to act as a barrier. Discoloration will not harm the performance of the material.

InstaGrout™ Sealant may also be protected with a weather proofing paint or coating. Acrylic, urethane and epoxy based products have excellent adhesion to the foam.

Application:

Field-Ready Kits
Polywater® InstaGrout™ Sealant is a two-part system packaged in pre-measured quantities for easy, on-site mixing.

Application Temperature

Working temperature for Polywater® InstaGrout™ Sealant is 35°F to 110°F (4°C to 43°C).

Usage Quantity

Carefully measure the area to be sealed by multiplying the width by the length of the opening pad in the structure. Do not subtract any conduits or other stub-up utilities. Use this measurement to estimate the minimum quantity required. Round up to determine quantity of InstaGrout™ Sealant required. It is best to use field measurements rather than measurements from plans or specs to calculate your job quantity. The openings to be filled in the field may not have the same dimensions as the drawing.

Example: Pull box measuring 15 inches (1.25 feet) by 36 inches (3 feet).

- *Pull box area is 3.75 square feet.*
- *Seal requires one PMT-3 Kit and one PMT-1 Kit to cover 4 square feet at 3 inches. The additional PMT-1 will fill any holes or gaps left after the application of the PMT-3 Kit.*

Kit Size	Area Coverage (3-inch depth)	Volume Coverage
PMT-1	1 square foot	0.25 ft^3
PMT-3	3 square feet	0.75 ft^3
PMT-10	10 square feet	2.5 ft^3

Area Preparation and Application

Prepare target area by filling holes and leveling the surface. Cover pea-gravel with one inch sand or dirt. Mix two parts well for at least 30 seconds until the product is a uniform gray color. Slowly pour onto target surface.

For full installation information, please see the InstaGrout™ Installation Instructions.
(www.polywater.com/PMTinstructions.pdf)

Re-entering:

Additional conduits or cables may be passed through InstaGrout™ Sealant with relative ease. Cured InstaGrout™ Sealant may be drilled with auger bits or hole saws designed for wood. The overall integrity of the seal allows such drilling without collapsing the seal, which may be seen with grout. Simply drill through the InstaGrout™, and pass through the conduit or cable. Once the new conduit or cable is in place, an additional application of InstaGrout™ can reseal the area against future intrusion.

Cure Rate:

Application Temperature
Polywater® InstaGrout™ Sealant will set up and cure more quickly in warm temperatures.

Temperature	Seal Formation	Full Cure
35°F	1 hour	12 hours
70°F	20 minutes	4 hours
110°F	8 minutes	2 hours

Safety:

Polywater® InstaGrout™ Sealant is a two-part urethane containing highly reactive chemicals. Polyurethanes are common in the construction industry and have been used for many years. Some individuals may become sensitized to components in the unreacted resin. Precautions must be observed during use and handling of these materials.

The use of Polywater® InstaGrout™ Sealant in the prepackaged containers controls and reduces exposure. Use of protective gloves and eyewear is recommended. Once reacted, the foam is a solid, closed-cell polyurethane. The finished product may be considered non-toxic. See SDS for more information.

Clean-up

Any unreacted material may be cleaned from surfaces with Polywater's Grime-Away™ Multipurpose Cleaner. Reacted material must be removed mechanically by scraping or sanding.

Storage and Handling:

Keep containers cool, dry and away from sunlight. Leave cartridges in the protective foil pouch until ready to use/reuse.

Product shelf life is one year.

Order Information:

Cat #	Package Description
PMT-1 (covers **one** ft^2 at 3-inch depth)	1 Bottle Part A 1 Bottle Part B 1 Pair Gloves Instruction Sheet
PMT-3 (covers **three** ft^2 at 3-inch depth)	1 Bottle Part A 1 Bottle Part B 1 Pair Gloves 1 Mixing Pail 1 Mixing Stick Instruction Sheet
PMT-10 (covers **ten** ft^2 at 3-inch depth)	1 Jug Part A 1 Jug Part B 2 HTC-1 (Grime-Away™ Wipes) 1 Pair Gloves 1 Mixing Pail Instruction Sheet *(recommend using a drill paint mixer to mix)*

Lit-PMTTech/REV000

Makers of Polywater® and Dyna-Blue® Cable Lubricants and Pull-Planner™ Software

American Polywater® Corporation

11222 60th St. N
Stillwater, MN 55082
U.S.A
1-800-328-9384
1-651-430-2270
http://www.polywater.com(URL) support@polywater.com(e-mail)

Polywater®

UPR™ PR & NF "No Flow"

UTILITY POLE RESTORATION PRODUCTS

Polywater® UPR™ Pole Repair products simplify repairing holes in wood utility poles caused by woodpeckers. The two-part formula mixes in the nozzle as it is injected into the damaged area. A partially used cartridge can be resealed and used again by attaching a new nozzle.

The UPR™ resin and hardener were formulated to expand in the pole cavity to allow for quick and easy sealing and fewer labor hours. Because UPR™ expands in the hole, it fills irregularly shaped cavities for solid integration with the wood. This creates superior adhesion to the wood grain compared to other nonexpanding products.

Both UPR™ PR and NF harden similar to wood, making the repair gaffable.

UPR® PR and NF are packaged in kit form. Everything needed to repair damage to wood poles is included.

- No drilling to deploy product – Less labor time
- No mixing or direct handling of the product – Less mess
- No special deployment tools needed – Less expensive
- Single kit minimum order – Less stock
- Type PR kits include green-treated blocks – Less product needed

To fix one "football" sized hole on a pole, order UPR-PRKIT3 or UPR-NFKIT4. For multiple holes, transmission line jobs, or volume pricing order UPR-PRKIT12 or UPR-NFKIT12.

Polywater® UPR™ PR

Catalog Number	Description	Unit/Case
UPR-PRKIT3	3 UPR™ PR Pole Repair cartridges, 4 mixing nozzle, 5 green-treated wood blocks, 1 roll of stretch wrap, 1 pair of gloves, instructions.	1
UPR-PRKIT12	12 UPR™ PR Pole Repair cartridges, 16 mixing nozzles, 18 green-treated wood blocks, 1 roll of stretch wrap, 4 pairs of gloves, instructions.	1

New Polywater® UPR™ NF is a fast-reacting formula designed to thicken immediately. This prevents product from running out of small holes or cracks in the pole and getting on clothing or climbing gear.

Catalog Number	Description	Unit/Case
UPR-NFKIT4	4 UPR™ NF Pole Repair cartridges, 6 mixing nozzles, 1 roll of stretch wrap, 1 pair of gloves, instructions.	1
UPR-NFKIT12	12 UPR™ NF Pole Repair cartridges, 18 mixing nozzles, 1 roll of stretch wrap, 3 pairs of gloves, instructions.	1

To view technical information on our website go to:
Support Page: www.polywater.com/upr.asp
Lubricant Application Videos: www.polywater.com/videos.asp

American Polywater® Corporation
phone: 1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
email: support@polywater.com
11222 60th Street North, Stillwater, MN 55082, U.S.A.

ADHESIVES | CLEANERS | LUBRICANTS | **SEALANTS** WWW.POLYWATER.COM

LIT-UPRFLYER/REV001

Utility Pole Restoration
UPR™ PR (Standard) and NF (No Flow)

American Polywater® Corporation

TECHNICAL DATA SHEET

Description:

UPR™ PR and NF Pole Repair Sealants repair woodpecker holes in wooden utility poles. They are easy and convenient to use. The two-part formulas are deployed with a standard caulking gun and mix right in the nozzle. There is no direct handling of the products.

UPR™ PR kits include wood blocks to fill cavity space so that less product is required. UPR™ NF quickly gels so that it does not flow through cracks in the wood.

UPR™ PR and NF Pole Repair expand in the hole to fill irregular shaped cavities and integrate with the wood. This creates superior adhesion to the wood. It hardens like wood with compression strength similar to the cross-sectional hardness of a wood pole. They remain gaffable and will not chip out in chunks when a climber's hooks are embedded into its surface structure.

Compressive Strength

UPR™ PR and NF Pole Repair have similar compressive strength to wood, perpendicular to the grain. Common utility pole wood is compared.
(Data U.S. Forest Products Laboratory)

Compressive Strength

UPR™ PR Standard	1500 psi
UPR™ NF No Flow	850 psi
Southern Yellow Pine	910 psi
Douglas Fir	760 psi

UPR™ PR and NF Pole Repair match wood pole strength. The repair area will not create a stress point when the pole flexes during storms and high winds.

Fungal Resistance

UPR™ PR and NF Pole Repair are inert materials: mold and fungus cannot use them as a food source. The reaction temperatures exceed 212° F (100° C), eliminating most molds and fungus. The repairs block moisture. This keeps the areas dry and less likely to support mold and fungus growth.

Woodpecker damage repaired with UPR™ Pole Repair

Product Benefits:

- Expands to fill all voids
- Creates a strong resilient repair
- Blocks water ingress
- Matches wood characteristics, gaffable
- Wide installation temperature range

Installation Benefits:

Both UPR™ PR and NF Pole Repair come in convenient packaging and kitting.

- No special deployment tools needed
  Less expensive, more convenient
- No drilling to deploy the product
  Less labor time
- No mixing or direct handling of the product
  Less mess and safer
- Single kit will repair one hole
  Less waste

Component Properties:

Both UPR™ PR and NF Pole Repair are two-part, urethane structural foams mixed at a 1/1 ratio.

UPR™ PR & NF Pole Repair

Property	Part A (Resin)	Part B (Curing Agent)
Color	Amber	Brown
Form	Liquid 200 -250 cps	Liquid 1050 cps
VOC Content:	0 g/L	0 g/L
Specific Gravity	1.22 -1.23	1.05

Cured Properties:

Both products cure to solid, closed-cell foams.

UPR™ PR & NF Pole Repair

Property	Typical Result
Appearance	Brown with small, even cells
Closed Cell Percent	> 90%
Density (static mixer)	
UPR™ PR Standard	25 lbs/cu ft
UPR™ NF No Flow	26 lbs/cu ft
Compressive Strength (ASTM D1691)	
UPR™ PR Standard	1,500 psi
UPR™ NF No Flow	850 psi

Moisture Testing:

UPR™ Pole Repair does not absorb water, so it will not increase the chance of pole decay. It is good practice to use a dry fungicide prior to deploying any wood pole repair product to reduce or negate any fungal growth that is present.

Moisture Repellency Testing
Six 1-1/2-inch cubes reacted UPR™ were aged in water for 7 days at 122°F (50°C). Weight gain was measured.

	Water Weight Gain
UPR™ PR Standard	< 1%
UPR™ NF No Flow	< 1%

The UPR™ PR and NF Pole Repair act to seal the hole from water and protect the pole from further degradation.

OSHA Requirements:

OSHA 1910.269 App D requires poles to be inspected and tested before climbing. The standard notes that “hollow spots and woodpecker holes can reduce the strength of the wood pole.” Pole repair satisfies OSHA requirements and improves the pole strength. It also reduces the likelihood of decay.

Gaff Testing:

Cut-Out Test

The “Pole Cut Out Test”[1] was used as a guideline to test Polywater’s UPR™ PR and NF Pole Repair repairs. In this test, the climber jabs the gaff into the pole at a 30° angle to a depth of ¼-inch. Pressure is exerted onto the gaff and the point of the gaff penetrates the wood. The pole surface cut is measured, and shall be no more than 2 inches.

[1] *Buckingham Manufacturing Company, Inc. Buckingham Gaff & Climber Information; “How to Perform the Pole Cut Out Test”*

Gaff Surface Cut	Result
½ to 1-½inch	Pass

The Pole Cut-Out Test showed that both UPR™ PR and NF Pole Repair are gaffable.

Penetration Test

UPR™ PR and NF Pole Repair were molded into 7-inch cylinders. A Buckingham gaff was used to penetrate the side of the form. An Instron unit was set to 50 mm/minute to drive the gaff into the form to a depth of 0.475 inches and load force was measured. An average of three tests was calculated:

Substrate	Penetration Force
UPR™ PR Standard	270 lb_f
UPR™ NF No Flow	140 lb_f
Douglas Fir	244 – 290 lb_f
Southern Yellow Pine	232 – 475 lb_f

Both UPR™ PR and NF Pole Repairs fall within the same range as the wood poles[2] and are relatively easy to penetrate.

[2] Shupe, Todd F. and Freeman, Mike H. (October, 2011) *Effect of Preservative Type and Gaff Type on Gaff Penetration Into Wood Poles*. Eastern Utility Pole Conference, Baltimore, MD.

Installation:

Polywater® UPR™ PR and NF Pole Repair are packaged in kit form. Everything needed to repair damage to wood poles caused by woodpeckers is included.

The two-part formulas are dispensed using a 2-part coaxial caulking tube with static mixing nozzle. They do not require hand mixing, which allows for multiple applications, and makes it easier to direct the product into the hole when deployed. The curing temperatures are not dangerously hot as are some other repair products, yet may be warm enough to reduce pole decay.

Once a skin has formed, the foam may be visually inspected through the shrink wrap to determine whether the hole has been completely filled.

To decrease cure time in cold temperatures, warm UPR™ Pole Repair cartridges prior to use. UPR™ NF *must be warmed* to 60°F.

Usage Quantity

UPR™ PR Standard

Hole Depth (in)	Product Required	Hole Diameter 6 inches	Hole Diameter 8 inches
8	Cartridge	3	6
	Blocks	5	7
12	Cartridge	5	9
	Blocks	6	10

UPR™ NF No Flow

Hole Depth (in)	Product Required	Hole Diameter 6 inches	Hole Diameter 8 inches
8	Cartridge	5	9
12	Cartridge	8	13

Safety:

UPR™ PR and NF Pole Repair are two-part urethane foams containing reactive chemicals. Polyurethanes are common in the construction industry and have been used for many years. Some individuals may become sensitized to components in the unreacted resin. Precautions must be observed during use and handling of these materials.

Cure Rate:

UPR™ PR can be used in temperatures down to 20°F (-6°C) as long as the cartridge is above freezing. UPR™ NF can be used in temperatures down to 20° F (-6°C) but *must be warmed* to 60° F (15°C). At low temperatures, the reaction is slow, but will completely foam and cure with time. At cold temperatures, the components become more viscous and flow through the mixing nozzle at a slower rate. This higher viscosity may block the UPR™ NF nozzle if it is not warmed. Cure times are as follows:

UPR™ PR Standard Pole Repair	Reaction Time (Minutes) 40° F (4° C)	70° F (21° C)
Foaming, Expansion Complete	8 - 9	4 – 5
Hard, Non-sticky Skin Formation	15 – 18	7 – 9

UPR™ NF No Flow Pole Repair	Reaction Time (Minutes) 40° F (4° C)	70° F (21° C)
Foaming, Expansion Complete	--	3 – 5
Hard, Non-sticky Skin Formation	--	3 – 5

Environmental Resistance:

UPR™ PR and NF Pole Repairs withstand the rigors of the changing, outdoor environment.

Cured Sealant Temperature Use Range
-40° F to 150° F (-40° C to 65° C)

Clean-up

Any unreacted material may be cleaned from surfaces with a solvent wipe such as Polywater's Type HP™ Cleaner/Degreaser. The Part A, amber resin will react with water if surfaces are washed with a soap and water solution. Once reacted, the foam has strong adhesion, and may be scraped or cut from surface. The reacted product is an inert solid with non-hazardous character.

The use of UPR™ PR and NF Pole Repair in the prepackaged cartridge controls and reduces exposure. Once reacted, the foams are solid, closed-cell polyurethanes. The finished products may be considered non-toxic. See SDS for more information.

Storage and Handling:

Keep containers cool, dry and away from sunlight. Leave cartridges in the protective foil pouch until ready to use/reuse.

Product shelf life is one year. Shelf life is one month after the product is opened.

Model Specification:

The statements below may be inserted into a customer specification to help maintain engineering standards and ensure work integrity.

Approved utility pole repair sealant is UPR™ Pole Repair Sealant. The repair sealant shall come in a multiple-use cartridge to fill various sized defects in poles. The sealant shall be an expanding foam system to best fill all voids in the defect.

The packaging shall automatically meter and mix the sealant. The sealant kit shall include wood blocks which act as filler reducing the needed amount of sealant. The cure rate of the sealant shall be fast. It shall reach full expansion in less than 5 minutes at 70°F (21°C) and form a hard, non-sticky skin in less than 10 minutes at 70°F (21°C). The reaction temperature of the sealant should reach a minimum of 212°F (100°C) to help kill microbes present in the defect.

Once cured, the sealant shall be waterproof. The sealant shall have compressive strength similar to utility wood as measured perpendicular to the grain. It shall be between 750 and 2,000 psi. The foamed sealant shall have a density of 25 lbs/cu ft. The foamed sealant shall pass the Cut-Out Test to determine gaffability. The sealant shall yield a less than 300 lbf in the Gaff Penetration Test.

Order Information:

Cat #	Package Description
UPR-PRKIT12 (1 unit/case)	12 - 8½-oz two-part foam caulking style cartridges with resealing cap 16 - Static mixing nozzles 1 - Roll shrink wrap 18 - Wood blocks (filler) 1.5” X 1.5” X 4” 4 - Pair gloves 1 - Instructions
UPR-PRKIT3 (1 unit/case)	3 - 8½-oz two-part foam caulking style cartridges with resealing cap 4 - Static mixing nozzles 1 - Roll shrink wrap 5 - Wood blocks (filler) 1.5” X 1.5” X 4” 1 - Pair gloves 1 - Instructions
UPR-NFKIT12 (1 unit/case)	12 - 8½-oz two-part foam caulking style cartridges with resealing cap 18 - Static mixing nozzles 1 - Roll shrink wrap 3 - Pair gloves 1 - Instructions
UPR-NFKIT4 (1 unit/case)	4 - 8½-oz two-part foam caulking style cartridges with resealing cap 6 - Static mixing nozzles 1 - Roll shrink wrap 1 - Pair gloves 1 - Instructions

For installation instructions, video and other product information, please see the **UPR™ Pole Repair Website**
(www.polywater.com/upr.asp)

Makers of Polywater® and Dyna-Blue® Cable Lubricants and Pull-Planner™ Software

American Polywater® Corporation

11222 60th St N
Stillwater, MN 55082
U.S.A
1-800-328-9384
1-651-430-2270
http://www.polywater.com (URL) support@polywater.com (e-mail)

AirRepair®

Pressurized Leak Repair System

FEATURES

Easy to apply paste — Seals hard-to-reach areas.

Fast cure — Typically ready for pressurization in under 15 minutes.

Seals many materials — Lead-sheathed cables and splice enclosures; polyethylene cable jackets, load coils, end-plates and more.

Saves money — Less expensive and faster than hot lead wiping.

Simple — No torches or power sources; no wrapping or clamping required.

Convenient — Kit contains all materials needed to seal multiple leaks.

Durable — Impervious to water and many other manhole contaminants.

American Polywater® Corporation

1-800-328-9384
1-651-430-2270
fax 1-651-430-3634
support@polywater.com (e-mail)

www.polywater.com

AirRepair® Sealant

The AirRepair® Sealant is a 2-part, fast curing, gray paste. The AirRepair® 2-Part paste is packaged in an easy-to-use, field-friendly system. Premeasured packaging contains enough material to seal one typical leak, approximately 6 square inches at a coating thickness of ¼-inch.

Once mixed, the no-sag paste can be immediately applied to the cable or splice underside, along seams and in the "crotch" area. The sealant will hold air pressure within 10 minutes of mixing and application. The sealant cures at ambient temperatures as low as 40°F, forming a tough seal. The cured seal is resistant to water, salt, oils, and other manhole contaminants.

AirRepair® Sealant Physical Properties

Color: Dark Grey

Viscosity: No-Sag, Thick Paste

Pot Life: 5 Minutes @ 70°F / 21°C

Durability: Resistant to Water

Cured Hardness: 75 (Shore D)

Adhesion to Lead and Metals: Good

Adhesion to Plastic: Good (may require primer)

AirRepair® Kit

The kit contains the preparation and patching materials necessary to repair air leaks in leadsheathed cables and splice enclosures.

Support components may include cleaning wipes, plastic primer, abrasive cloth, mixing and application tools, gloves, and instructions.

The AirRepair® Sealant is provided in a kit customized to end user needs.

Single use kits also available.

Contact us for Kit Configuration.

Important Notice: The statements here are made in good faith based on tests and observations we believe to be reliable. However, the completeness and accuracy of the information is not guaranteed. Before using, the end-user should conduct whatever evaluations are necessary to determine that the product is suitable for the intended use.

American Polywater expressly disclaims any implied warranties and conditions of merchantability and fitness for a particular purpose. American Polywater's only obligation shall be to replace such quantity of the product proven to be defective. Except for the replacement remedy, American Polywater shall not be liable for any loss, injury, or direct, indirect, or consequential damages resulting from product's use, regardless of the legal theory asserted.

American Polywater® Corporation

11222 60th St. N.
Stillwater, MN 55082
U.S.A
1-800-328-9384
1-651-430-2270
fax 1-651-430-3634
support@polywater.com (e-mail)

LIT–ARFLYER/REV001

www.polywater.com/airrepair.asp

Pressurized Leak Repair

TECHNICAL DATA SHEET

Description:

AirRepair® Paste Sealant is a two-part, rapid-cure, resin system for pressurized telephone cables and splices. AirRepair® seals air leaks in lead-sheathed cables and splice enclosures, polyethylene Stalpeth® cable jackets, load coils, end-plates, and more. AirRepair® eliminates messy and dangerous molten lead "hot wipe" procedures. The cured resin maintains a high level of adhesion and structural integrity to insure a quality leak repair.

AirRepair® Sealant is sold as a field repair system and includes materials to seal active leaks. It is a fast cure sealant designed for quick and easy use. AirRepair® allows a single craftsperson, with minimal training, to effectively and economically seal 20 or more leaks per day. Sealant bonds to polyethylene, lead, aluminum, ceramic and steel.

Performance:

AirRepair® Paste Sealant is designed specifically for the field repair of air-pressurized cable systems.

To test the performance, specialized test methods were developed. A 1/16-inch hole is punched into the center of a lead disk and placed into a small, specially designed pressure chamber set to 10 psi. Repaired disks are kept under pressure for 24 hours to pass the test.

Aging Condition on Lead	Result
Initial Application	Pass
6 Months Ambient Aging	Pass
6 Months Immersion, Tap Water	Pass
6 Months Immersion, Salt Water	Pass

In similar testing, an air-core, polyethylene cable and a galvanized steel pipe are punctured with a 1/16-inch hole, sealed and pressurized.

Aging Condition	Result
Polyethylene Cable, 80 psi	Pass
Galvanized Pipe, 200 psi	Pass

Product Benefits:

- Quick plugging action
- Easy to install, fast repair time
- Permanent, long-lasting seal
- Durable, withstands environmental extremes
- Impervious to water and other manhole contaminants
- Seals and protects oil-filled system
- Convenient, field-ready kit

Typical Applications:

- Lead Splice
- Load Coil
- Manifold
- Waffle Case
- End Plate
- Polyethylene “Air-Core” Cables

Component Properties:

AirRepair® Sealant is a 2-part, thick paste sold ready to mix and use.

Property	Part A (Resin)	Part B (Curing Agent)
Color	Black	White
Form	Thick Paste	Thick Paste
VOC Content:	0 g/L	0 g/L
Specific Gravity	1.7	1.4

Cured Properties:

AirRepair® Sealant cures to form a solid patch. Pre-measured packaging contains enough material to seal one typical leak, approximately 6 square inches at ¼-inch thickness.

Property	Typical Result
Color	Dark Grey
Peak Exotherm @ 70º F	< 200°F
Hardness 7 Days @ 70º F (Shore D Durometer)	75
Flexural Strength (ASTM D790)	6,925 lb_f/in^2 1.43 X 10^{-2} in/in

Typical Impact Resistance:

Substrate	Result
Air-core polyethylene cable	55 in-lbs
Air-core lead cable	65 in-lbs

Tested using ASTM G14. Samples are sanded, cleaned and allowed to cure for 24 hours.

Typical Shear Strength:

Substrate	Result
Aluminum	> 1,000 lbs/in^2
Polyethylene	114 lbs/in^2
PVC	148 lbs/in^2

Tested using ASTM D1002. Samples are sanded, cleaned and allowed to cure for 24 hours.

Typical Peel Strength:

Substrate	Result
HDPE (90°)	49 pli
Glass-filled PPO Resin	34 pli
PVC (90°)	46 pli
Ceramic (90°)	>100 pli
Galvanized Steel (180°)	>100 pli
Aluminum (180°)	>100 pli
Lead (180°)	16.5 pli
Copper (180°)	>100pli
Stainless Steel (180°)	>100 pli

Tested using ASTM C794. Samples are sanded, cleaned and allowed to cure for 24 hours.

Chemical Resistance

AirRepair® Sealant is chemically resistant to dielectric fluids, SF_6 gas, uv, water and oil.

ASTM D1002 is used to test the shear strength of the PowerPatch® Sealant on steel after exposure to solvent. The sample is allowed to cure 7 days, immersed in solvent and aged at 50°C.

Fluid*	Appearance (6 months)	Comparison to Control
Mineral Oil	No Change	100% (Pass)
Polybutene Fluid	No Change	100% (Pass)
Hydrocarbon Fluid	No Change	100% (Pass)
Silicone Oil	No Change	100% (Pass)

**Mineral Oil (Holland 70), Polybutene (Duddek PLIC), Hydrocarbon Fluid (Bio Temp), Silicone Oil (GE Silicone SF 96-100)*

Application:

AirRepair ® Sealant is easy to use. For full installation information, please see AirRepair® Use Instructions. *(www.polywater.com/ARinstructions.pdf)*

For applications on polyethylene, Stalpeth® cable, AirRepair® Plastic Primer is available.

In cold weather, materials should be kept as warm as possible. Store materials in a warm vehicle and use chemical warming pad to increase the temperature of the repair area.

Cure Rate:

Application temperature is 40°F to 120°F. Cure rate depends on temperature.

Temperature	Working Time	Functional Cure
35° F	40 Minutes	7 Hours
52° F	20 Minutes	3 ½ Hours
60° F	10 Minutes	1 ½ Hours
70° F	6 Minutes	60 Minutes
88° F	4 Minutes	40 Minutes

Installation:
A pressure test was used to determine seal time under ambient conditions. Lead disk was prepared, and placed into specially designed pressure chamber.

Aging Condition	Seal Time	Result
Seal time at 70°F	6 Minutes,	Holds 10 psi air pressure

At ambient temperatures, seal is completed in less than 10 minutes.

Vertical Sag:

AirRepair® Paste clings to vertical surfaces and other difficult angles common in field repairs. Once applied, it stays in place.

In this test, the AirRepair ® Paste is mixed and applied to a metal platen at a 90° angle. Displacement is measured and recorded.

Temperature	Displacement from Center
60°F	0 inches
75°F	1/16 inch
95°F	3/32 inch
110°F	3/16 inch

AirRepair ® Paste shows minimal sag within a large temperature range.

Environmental Resistance:

Temperature Range:

Application:	40°F to 120°F
Usage:	-40°F to 400°F

Temperature Cycle Testing
(-22 ºF/203 ºF 10 Cycles)
No significant change in adhesion:

Material	Adhesion Compared to Non-Aged Control
Galvanized Steel	100 % (Pass)
Aluminum	100 % (Pass)
Ceramic	100 % (Pass)
Copper	100 % (Pass)
Stainless Steel	100 % (Pass)
Lead	100 % (Pass)

AirRepair ® Sealant is resistant to ultraviolet exposure and withstands direct sunlight with no decrease in functionality.

Safety:

AirRepair ® Sealant has a low level of toxicity. Good industrial hygiene practice and appropriate precautions should be employed during use. Avoid inhalation of vapors and personal contact with the product. Provide appropriate ventilation/respiratory protection against decomposition products during welding/flame operations (i.e. torches used to install heat shrink products) on or near cured product. See SDS for specific details.

Storage and Handling:

Keep containers cool, dry and away from sunlight. Keep containers tightly closed.

Product shelf life is 15 months.

Model Specification:

The statement below may be inserted into a customer specification to help maintain engineering standards and ensure work integrity.

Approved air pressure repair compound is AirRepair® Sealant. The air pressure repair compound shall be available in a system that allows rapid, permanent repairs without any special equipment. It shall be possible to make the repairs under low air pressure. The product shall not sag during cure so that it may be applied to the bottom side of leaking surfaces without running or dripping. Once cured, the adhesive patch shall have the following properties.

The adhesive repair patch shall have excellent adhesion to a variety of substrates with minimum peel strength of 15 pli on lead, 40 pli on polyethylene, 100 pli on steel, and 100 pli on ceramic when measured by ASTM C 794. The adhesive repair patch will retain 100% of the adhesion as measured by peel strength after 5 freeze/thaw cycles. The adhesive repair patch shall withstand temperatures from -50°F to 250°F. It shall be impervious to water, salt water, oils, and dilute acids and bases.

The repair patch shall have the flexibility to withstand a steel ball impact of at least 65 in-lbs on lead and 55 in-lbs on polyethylene as measured by ASTM G14. It shall have a minimum flexural strain of 1.1 in/in as measured by ASTM D790. The adhesive patch shall not contain any metals. It shall be non-conductive and shall not corrode.

Order Information:

Cat #	Package Description
AR-KIT97	1 Set Two-Part AirRepair® Sealant (parts A and B) 1-3/4" Putty Stick 2 Type RP Cleaning and Preparation Wipes 12" Strip Sanding Cloth 2 Mixing Sticks 1 Pair disposable gloves 1 Instruction sheet
AR-KIT97P ***(Special Order)***	AR-KIT97 Components ½-oz Plastic Primer 1 Cotton Swab Primer Applicator
AR-KIT99	1 Set Two-Part AirRepair® Sealant (parts A and B) 1-3/4" Putty Stick 3 Type RP Cleaning and Preparation Wipes 12" Strip Sanding Cloth 2 Mixing Sticks ½-oz Plastic Primer 1 Cotton Swab Primer Applicator 1 Trowel Tool 1 Pair disposable gloves 1 Instruction sheet

***Custom kits available. Call factory for details*

Makers of Polywater® and Dyna-Blue® Cable Lubricants and Pull-Planner™ Software

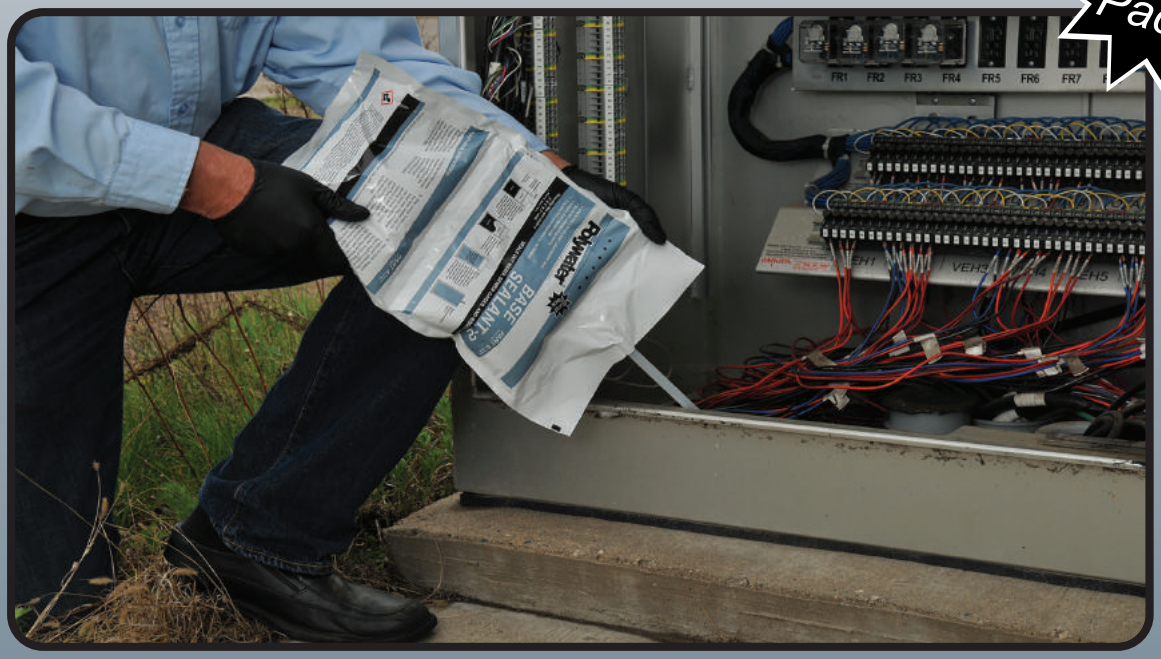
American Polywater® Corporation

111222 60th St. N.
Stillwater, MN 55082
U.S.A
1-800-328-9384
1-651-430-2270
http://www.polywater.com(URL) support@polywater.com(e-mail)

Polywater®

PEDFLOOR™ Base Sealant

Burst Pack

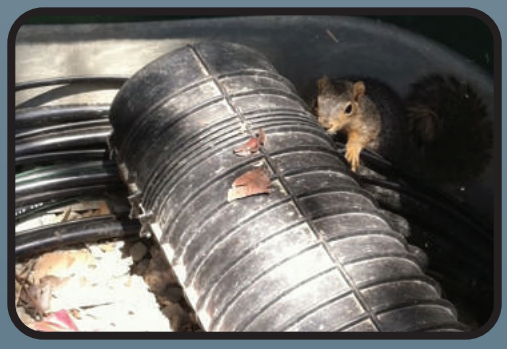


PedFloor™ Base Sealant prevents costly outages and service disruptions. It keeps out moisture and denies burrowing pests an access to the enclosure. *PF* creates a solid, impermeable barrier at the cabinet base. Use it to protect standby power supplies, DOT control cabinets, switches and other gear.

Prevent:

Dangerous encounters

Damage from rodents

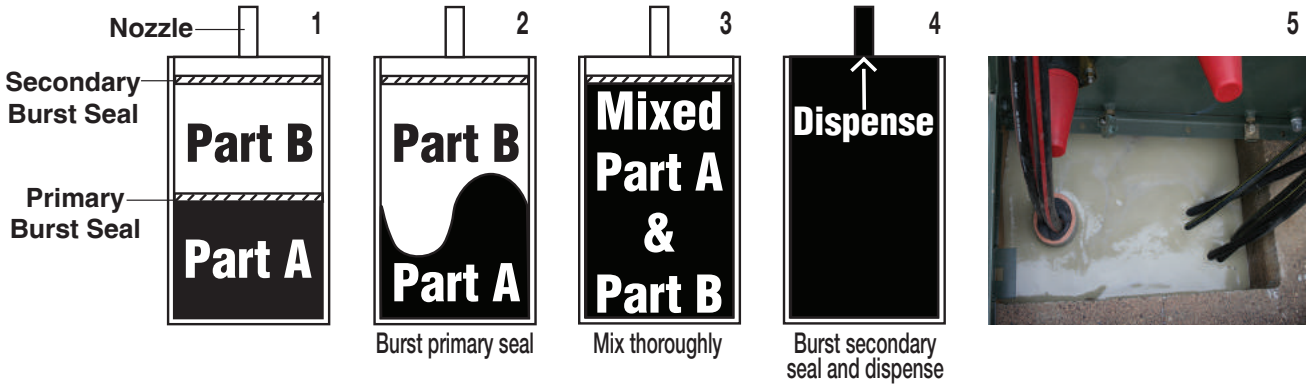


Unsanitary conditions

- Keeps out rodents, snakes and insects
- Flows and self-levels before expanding
- Easy to mix and apply-no water required
- Compatible with all cable jacket and conduit materials
- Sturdy, cross-linked structure tolerates environmental extremes-will not crumble

Polywater® PedFloor™ Base Sealant

How the Burst Pack works:



PedFloor™ Base Sealant comes in a convenient Burst Pack for easy field installation with no tools or applicators needed.

Cat.No.	Kit Components	Case Qty
PF-2 Covers 2' square, 3" thick.	1 PedFloor™ Burst Pack, 1 Pair Gloves, 1 roll duct tape, 1 plastic sheet	2 Kits

For small repairs and/or supplemental patching, use a FST™ Burst Pack:

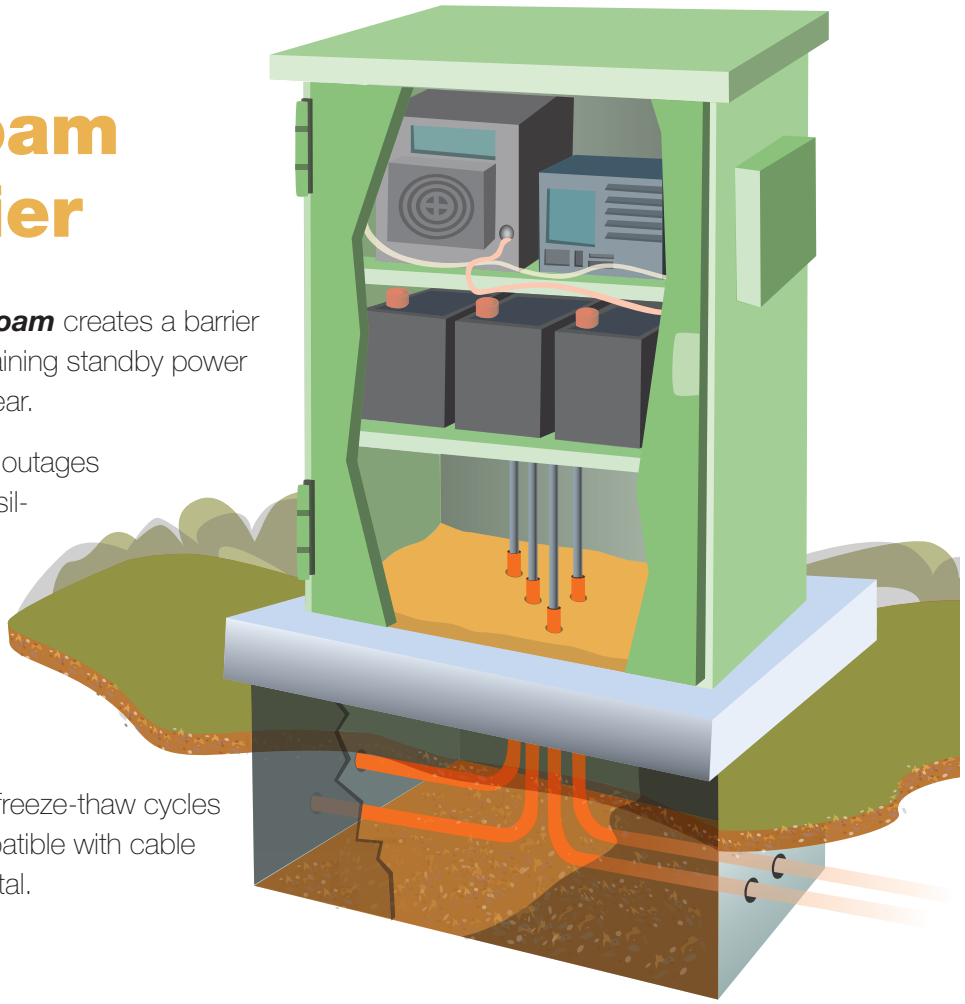
Cat.No.	Kit Components	Case Qty
FSTBP-200B6 Covers 0.5' square, 2" thick.	6 FST™ Burst Packs, 6 Pairs of Gloves, 1 Instruction Sheet	1 Kit

American Polywater® Corporation

phone: 1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
email: support@polywater.com
11222 60th Street North, Stillwater, MN 55082, U.S.A.

LIT-PEDFLOORFLYER/REV002

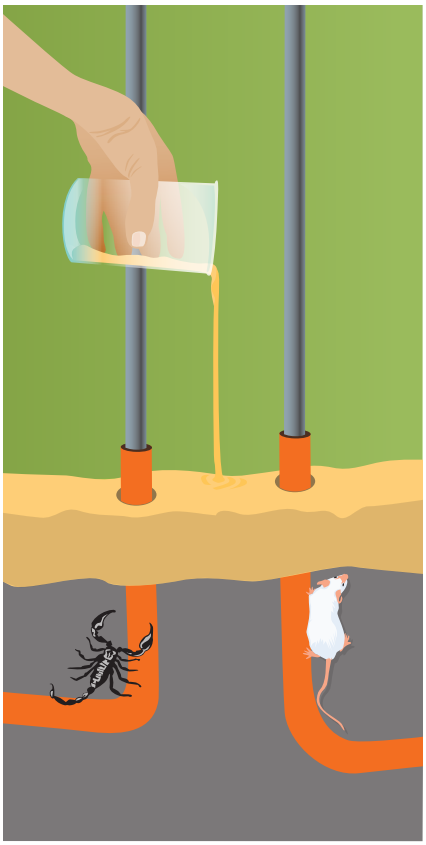
PedFloor™ Structural Foam Sealant Barrier



Polywater® PedFloor™ Structural Foam creates a barrier to protect pedestals and cabinets containing standby power supplies, splices, switches and other gear.

Polywater® PedFloor™ helps prevent outages and service disruptions by creating a resilient and impermeable barrier that keeps out moisture and stops rodents, snakes, and insects from burrowing up through earthen gaps into the enclosure, potentially causing costly outages or safety hazards to crews.

The strong, lightweight seal withstands freeze-thaw cycles and environmental extremes. It is compatible with cable jacket materials and will not corrode metal.



- Keeps out rodents, snakes and insects
- Structural Foam creates a strong, resilient, lightweight seal
- Flows and self levels before expanding
- Easy to mix and apply; no water required
- Tolerates environmental extremes
- Sturdy, cross-linked structure will not crumble or cave-in
- Excellent for power supply cabinets
- May be used as a suspended floor, or directly on ground

American Polywater® Corporation

1-800-328-9384
1-651-430-2270
fax 1-651-430-3634
custserv@polywater.com (e-mail)

www.polywater.com

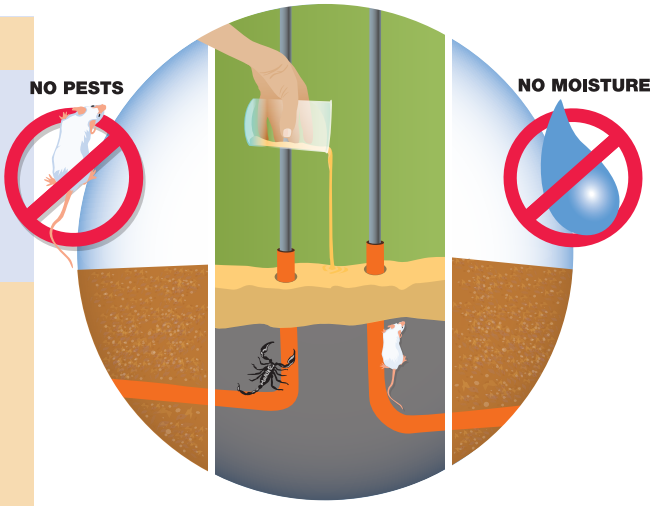
Hardening or sealing of the Outside Plant is a common goal for most Communications companies. But standard practice has not, in many cases, effectively sealed the ground from the inside of cabinets, enclosures, and pedestals.

Two major problems are solved with ***Polywater® PedFloor™***: First, it prevents mice, rats, snakes and insects from entering the enclosed space from underground, which reduces safety hazards to crews.

Second, with ***Polywater® PedFloor™*** a vapor barrier is established preventing condensation from warm ground air penetrating and condensing on cold cabinet walls or equipment.

Suspension of ***Polywater® PedFloor™*** Structural Foam Sealant between the enclosure and the vault is an innovative method that solves problems for those responsible for outside plant.

CAT #	DESCRIPTION	STANDARD PACKAGE	ORDER QTY
PF-1	This kit will cover **1 square foot** (approx.) with a three-inch depth.	Contains: 1 Bottle Part A 1 Bottle Part B 1 Pair Gloves 1 Plastic Sheet (per case) 1 Instruction Sheet 1 Roll Duct Tape (per case)	2/Case
PF-3	This kit will cover **3 square feet** (approx.) with a three-inch depth.	Contains: 1 Bottle Part A 1 Bottle Part B 1 Pair Gloves 1 Mixing Pail 1 Mixing Stick 1 Plastic Sheet 1 Instruction Sheet 1 Roll Duct Tape	1 Each



American Polywater® Corporation
1-800-328-9384
1-651-430-2270
fax 1-651-430-3634
support@polywater.com (e-mail)

LIT-PEDFLYER/REV001

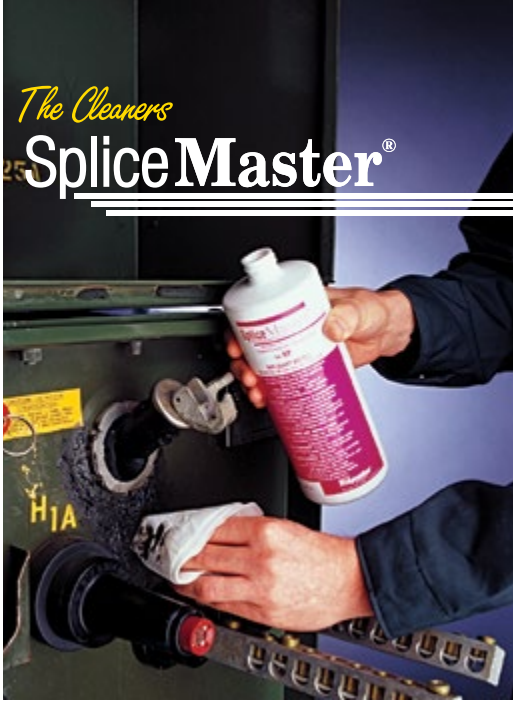
polywater.com/pedfloor.asp

American Polywater's

SpliceMaster®

Cleaners and Accessories for Safer Electrical Cleaning

A Family of Cleaners for Safer Electrical Cleaning



Cleaners and Accessories for Safer Electrical Cleaning

There are a number of SpliceMaster® Cleaner/Degreaser types available to meet different needs in cable and general electrical cleaning. They share the following features:

- **No Residue** - SpliceMaster® Cleaners evaporate completely and leave no residue. They meet IEEE 1493 requirement for less than 100 PPM residue.
- **High Solvency Power** - All are excellent cleaners for electrical grime like shield picks, corrosion inhibitor, silicone grease, and oils.
- **Accessories Compatible** - Tested to IEEE 1493. When used as directed, SpliceMaster® Cleaners do not harm insulating or semiconducting polymers. Polymer materials should never be soaked in cleaning solvent.
- **Environmental Status** - All cleaners are SNAP approved for intended use. They do not contain Class 1 ozone depleters or HAP's (Hazardous Air Pollutants).
- **Plastics Compatibility** - Some of the cleaners are suitable for use on solvent-sensitive plastics such as polycarbonate. Consult cleaner technical data sheet for specifics.
- **Safer, Controlled Use** - SpliceMaster® PEL-PAC® package controls release of, and exposure to, solvent vapors.

The Separate Types:

SpliceMaster® Cleaner Characteristics					
Cleaner Type	**Cleaning Power**	**Drying Rate**	**Flash Point**	**Meets IEEE 1493 Voltage Withstand**	**Features and Uses**
FD™	Good	Fast	>0° F	Yes	Available in aerosol cans or bulk containers. Fast evaporating cleaner for splicing cables, degreasing transformers or cleaning contacts. Economical and versatile. Crews that prefer aerosols will love Type FD™.
GP™	Excellent	Medium/ Fast	123°F (50°C)	Yes	Faster evaporating than citrus cleaners. A versatile cleaner for all operations. Available in bulk, towelette or kit packages. Great for silicone grease residue.
HP™	Good	Medium	>140 °F (>60°C)	Yes	Broadly effective, economical, general purpose cleaner. Use for electrical maintenance and general electrical cleaning. Can be dried from surface for fastest use. Comes in broad variety of packages for different use methods.
KC™	Good	Very Fast	None	Yes	A non-flammable, specialty, electrical cable and contact cleaner. Does not dissolve or stress crack most plastics. Very fast evaporating cleaner. Only available in aerosol cans. Excellent for cleaning cables, relays, electronic equipment, and contacts.
RP™	Excellent	Fast	19°F (-7°C)	Yes	Excellent replacement for chlorinated solvents in high voltage cable splice preparation. Leaves no residue. Available in pre-saturated towelettes and kit packages.

Packaging

PEL-PAC® Prep Kits

Kits provide everything needed for splice and termination cleaning. The cleaner is saturated on nonlinting wipes. Sanding cloth and dry towels are optional.

- Convenient. Everything Needed for the Job
- Safer. Minimizes Solvent Exposure
- No Spills or Mess

Aerosols & Sprays

Aerosols and directional sprayers provide a way to get solvent to hard-to-reach places.

- Convenient for Maintenance Use
- Adjustable Flow Spray Heads
- Cleans Hard-to-Reach Places

Bulk Packages

SpliceMaster®Cleaners are available in 55-gallon, 5-gallon, gallon, quart, pint, and spray aerosol containers. Special packages can be filled on customer request.

- Economical for Large Jobs
- Refill Spray Bottles Economically
- Convenient for Dipping or Pumping

The System

Cleaners and Packages for Convenience, Control and Safety

- Small PEL-PAC® Kit contains just enough for the job.
- Low volume of solvent in packs controls vapor exposure.
- Packs eliminate solvent spills and potential environmental liability.
- Packs fit in tool bag or pocket for convenient use.
- Choose the right cleaner for your job from multiple cleaner options.
- Package options designed for a variety of cleaning needs.
- Field-friendly cable preparation kits with optional abrasive and drying cloth.
- Aerosol sprays for diverse electrical maintenance use.
- American Polywater's support includes video on termination cleaning procedures.
- PEL-PAC® calculations can estimate vapor levels for safer working environment.
- American Polywater expertise. Whether VOC's, evaporation rates, or dielectric properties. Just ask.

DSCF7184

Other Accessories

Wet/Dry Systems

Surface drying of slower evaporating solvents speeds their use. Polywater's HP™ Tandem Pack™ (HP-P158ID) includes both a wet and dry wipe.

- Speed up cleaner evaporation and use.
- Minimize solvent contact time with rubber/plastic.
- Lint-free disposable wiping towels also available separately

Empty Solvent-Resistant Bottles

Empty refillable solvent-resistant bottles. Save money by purchasing bulk product and refilling bottles. Labeling with SpliceMaster® Cleaner available upon request.

Available in 2 sizes:
- ST-1 Pint with spray head
- ST-2 Quart with spray head

Dry Towels

Durable non-linting towelettes for applying bulk SpliceMaster® Cleaners or for wiping them dry.

Two convenient sizes:
- DT-69 (6"x9")
- DT-1212 (12"x12")

Cleaners/Degreasers

SpliceMaster®

Bulk Components and Accessories		
Product Number	**Package Description**	**Units/Case**
DT-69	Dry Towels: (200) Dry 6”x9” towelettes, non-linting, durable. Self-dispensing box	1
DT-1212	Dry Towels: (100) Dry 12”x12” towelettes, non-linting, durable. Self-dispensing box	1
SP-ROLL	Sanding Cloth: 1”x 50-yard roll of 120-grit, nonconductive aluminum oxide.	1
ST-1	EMPTY Solvent-resistant Bottles: 16-oz bottle with spray trigger head. **Special Order**	12
ST-2	EMPTY Solvent-resistant Bottles: 32-oz bottle with spray trigger head. **Special Order**	12
ST-R	Spray trigger head that fits pint or quart bottles	12

SpliceMaster® Product Numbers						
Cleaner Types						
FD™ Cleaner	**GP™ Cleaner**	**HP™ Cleaner**	**KC™ Cleaner**	**RP™ Cleaner**	**Package Description**	**Units/Case**
FD-DRUM	GP-DRUM	HP-DRUM	---	---	55-gallon drum	1
FD-640	GP-640	HP-640	---	---	5-gallon pail	1
FD-128	GP-128	HP-128	---	---	1-gallon container	4
FD-35LF	GP-35LF	HP-35LF	---	---	Quart bottle w/flip top	12
---	---	HP-16LF	---	---	Pint bottle w/flip top	12
FD-9	---	HPY-12	KC-16	---	Aerosol (16 oz can)	12
---	---	HP-1	---	RP-1L	8”x12” saturated wipe in pouch	144
---	---	---	---	RP-1	5”x8” saturated wipe in pouch	96
---	---	HP-P158ID	---	---	Tandem Pack™- wet/dry 5”x8” wipes	144
---	GP-D72	HP-D72	---	---	Canister with 72 10”x12” saturated wipes	6
---	GP-T369	HP-T369	---	---	PEL-PAC® Prep Kit for cable cleaning, in tin	24
---	GP-T369/S	HP-T369/S	---	---	PEL-PAC® Prep Kit for cable cleaning, in tin, with sanding strip	24
---	---	HP-T369/S-D	---	---	PEL-PAC® Prep Kit for cable cleaning, in tin, with sanding strip & drying towel	24
---	---	HP-P63	---	RP-P63	Prep Kit Pouch, 6 cleaning wipes/drying towels, 3 sanding cloths, instructions	12

NOTE: Product codes for the PEL-PAC® Prep Kit for cable cleaning shown are for tins. Kits are also available in pouches or with customized towel counts and sizes.

To view technical information on our website go to:
Support Page: **www.polywater.com/splicemaster.asp**

American Polywater® Corporation

phone: 1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
email: support@polywater.com
11222 60th Street North, Stillwater, MN 55082, U.S.A

LIT-SMFLYER/REV000

Type HP™
Multi-Purpose Cleaner

American Polywater® Corporation

TECHNICAL DATA SHEET

Description:

Type HP™ Cleaner effectively cleans semi-conducting cable shield, corrosion inhibiting compound, silicone greases, filling gels, transformer oils and many other contaminants found in electrical construction and maintenance. It evaporates with no residue. Type HP™ is non-conductive.

Type HP™ Cleaner replaces ozone-depleting CFC's, trichloroethane and other carcinogenic chlorinated solvents. Type HP™ Cleaner lasts longer than fast evaporating solvents and is compatible with most materials and plastics, including polycarbonate.

Type HP™ Cleaner is available in multiple package options. Bulk Type HP™ Cleaner is an excellent choice for soaking or rinsing parts. Pre-saturated towels limit solvent exposure and eliminate spill hazard. Depending on end use, Type HP™ Cleaner has the optimal package available.

Performance Properties:

Type HP™ Cleaner meets IEEE 1493 performance criteria[1]. It effectively cleans semi-conducting cable shield. A towel saturated with cleaner quickly removes the compound and becomes visibly black.

Property	Result
Cleaning Effectiveness	Excellent
KB Value	33
Hildebrand Solubility Parameter	7.5
Dielectric Strength 100 mil gap (ASTM D877):	>40 KV
Water Content (ASTM D1533B)	< 50 ppm
Evaporation Rate	Medium
Residue (ASTM D2369)	<100 ppm

[1] Tested using methods from IEEE 1493, "Guide for the Evaluation of Solvents Used for Cleaning Electrical Cables and Accessories."

Product Benefits:

- Excellent Solvency
- No Residue
- Non-Conductive
- Contains No Chlorinated Solvents
- Compatible with Most Plastics and Rubbers
- Multiple Package Options

End Use:

- Transformers
- Switch Gear
- Motor Control Devices
- Fusible Disconnecting Devices
- Wind Turbine Nacelles
- Relays
- Generators
- Motors
- Circuit Boards
- Rheostats
- Tools

Physical Properties:

Type HP™ Cleaner is a high purity solvent with low aromatic content.

Property	Result
Flashpoint (ASTM D93)	>140°F (60°C)
Initial Boiling Point	365°F (185°C)
Specific Gravity	0.79
Percent Aromatics	< 1%

Cleaning Properties:

Type HP™ Cleaner dissolves a broad range of contaminants. Contaminant is added to 20 grams cleaner at ambient temperature. The quantity dissolved is recorded.

Contaminant	Amount Dissolved
PCB (Aroclor® 1260)	10 grams
Cutting oil (Rigid Nu-Clear, sulphurized oil)	10 grams
Silicone grease (Dow Corning 4 Compound)	2 grams
Animal oil (Lanolin-Tech Grade)	2 grams

Usage Directions:

Type HP™ Cleaner is suitable for many types of cleaning and degreasing and is effective at room temperature. It does not freeze and can be used in cold weather applications.

Cleaning time and effectiveness will vary based on the contaminant and cleaning method. Wiping or agitation cleans faster than just soaking. Experiment with your particular contaminant and conditions.

Type HP™ Cleaner is residue-free. For precision cleaning, a final rinse of fresh cleaner should be used. Finish with a fresh wipe, spray until the solvent runs clear, or rinse in a fresh bath of Type HP™ cleaner.

For faster drying, air or centrifugal dryers can be used to accelerate evaporation. Wiping the part with an absorbent, lint-free towel (Cat.# DT-69) will reduce drying time considerably.

Drying Time Comparisons:

No Drying:	60-90 Mins.	Cool Air:	3-5 Mins.
Drying Wipe:	1-2 Mins.	Hot Air:	2-3 Mins.

Safety:

Type HP™ Cleaner has a low level of toxicity and does not contain any listed carcinogens. It is combustible and should not be exposed to fire or flame. Good industrial hygiene practice and appropriate precautions should be employed during use. See SDS for specific details.

Pel Pac System

Type HP™ Cleaner presaturated towelettes are a convenient package with multiple safety benefits.

Control
Presaturated wipes minimize solvent exposure on sensitive electrical parts. Directly spraying or immersing the part allows the solvent to puddle into small openings. Wipe cleaning will also ensure that the solvent evaporates more quickly.

Safety
The presaturated towelette package eliminates spill hazard and limits solvent vapor exposure. Wipes contain a carefully measured quantity of solvent and are an excellent way to control vapor. Type HP™ Cleaner presaturated towelettes are a great choice for underground or confined space applications.

Convenience
Each Pel-Pac package utilizes non-linting, non-tearing towels. Clean wipes are always available, eliminating recontamination of parts with dirty rags. Custom kits may include extra dry towels or abrasive cloth as needed.

Convenient Wet/Dry Tandem Pack (HP-P158ID) controls solvent exposure.

Environmental Impact:

Type HP™ Cleaner is a safer alternative to chlorinated solvents.

Property	Result
VOC Content	790 grams/liter
Global Warming Potential	Does not contain global warming compounds
Ozone Depletion Potential	None
CFC, HCFC, HFC Content:	None
RCRA	Not regulated as hazardous waste
CERCLA/SARA Status	Not regulated as a hazardous substance

Compatibility:

Type HP™ Cleaner is compatible with most common plastics and rubbers. It meets standard electrical utility test requirements based on IEEE 1493.

Plastic Materials - XLPE
XLPE jacket material immersed in Type HP™ Cleaner retains tensile and elongation characteristics and shows minimal weight change[1].

Rubber Materials – EPDM and Silicone Rubber
Platen samples of EPDM and Silicone Rubber immersed in Type HP™ Cleaner retain tensile and elongation characteristics and show minimal weight change[1].

Volume Resistivity of Cable Insulation Shield
Type 0691 XLPE immersed in Type HP™ Cleaner shows acceptable volume resistivity values[1]. After exposure to the cleaner, volume resistivity measurements return to control levels.

Corrosivity:
Type HP™ Cleaner will not corrode or stain metal parts. It does not tarnish or corrode copper[2].

[1] Tested using methods from IEEE 1493, "Guide for the Evaluation of Solvents Used for Cleaning Electrical Cables and Accessories."

[2] Testing based on ASTM D130, "Standard Test Method for Detection of Copper Corrosion from Petroleum Products by the Copper Strip Tarnish Test."

Soak Testing:

Materials are immersed in Type HP™ Cleaner for 72 hours at 50°C (122°F). Some rubbers will swell, but should return to their original state once the cleaner evaporates. Wipe cleaning minimizes solvent exposure.

Plastics	% Weight Change	Appearance
ABS	+0.04	NC
Acrylic	-0.01	NC
Delrin®	+0.03	NC
Epoxy	0.00	NC
Nylon 66	-0.02	NC
Nylon 101	+0.07	NC
Polycarbonate	+0.04	NC
Phenolic	-0.05	NC
PPO	+0.02	NC
PVC	+0.01	NC
Teflon®	+0.03	NC
Tygon®	-0.25	NC
Ultem® 1000	-0.01	NC
Valox® 420	0.00	NC

Elastomers	% Weight Change	Appearance
Neoprene®	+9.31	SS
Nitrile	-2.01	NC
SBR	+47.34	S
Viton®	+0.07	NC

KEY:

NC = No Change
S = Swelling
ES = Extreme Softening
C = Crazing
SS = Slight Swelling
D = Disssolved

Testing based on ASTM D543, "Standard Test Method for Resistance of Plastics to Chemical Reagents."

Model Specification:

The statement below may be inserted into a customer specification to help maintain engineering standards and ensure work integrity.

The cleaning solvent shall be at least 80% high purity, dearomatized, aliphatic hydrocarbon enhanced with a cyclic terpene. Aromatic content shall be less than 1%. Water content shall be less than 75 ppm.

The cleaner shall not leave a residue. The cleaner shall not significantly affect the volume resistivity of Union Carbide 0691 XLPE cable insulation shield. The cleaner shall show a voltage withstand of at least 40 kV before breakdown.

The cleaner shall not significantly affect the tensile and elongation properties of XLPE, silicone rubber, and EPDM rubber when tested to guidelines proposed in IEEE P1493. When wiped over an XLPE (Union Carbide Type 0691) insulation shield, a clean towel wetted with the cleaner shall become visibly "black" with two wipes over 2-inches of cable length with light hand pressure.

The cleaner shall not be a carcinogen or listed by CERCLA as a hazardous waste. It shall not be on the EPA Phase I or Phase II list of banned or phased-out chlorofluorocarbons.

Order Information:

Cat #	Package Description
HP-1	Single, saturated towelette 144/case
HP-P158ID	Wet/dry wipe Tandem Pack™ 144/case
HP-D72	72-Count Wipe Canister 6/case
HPY-12*	16-oz aerosol can 12/case
HP-16LF	1-pint bottle with flip top (475 ml) 12/case
HP-35LF	1-quart bottle with flip top (.95 Liter) 12/case
ST-R	Trigger sprayer, fits pint and quart bottles 12/case
HP-128	1-gallon bottle (3.8 Liter) 4/case
HP-640	5-gallon can (18.0 Liter)
HP-DRUM	55-gallon drum
HP-P63	Tandem Pack™ Cable Prep Kit contains 6 HP-P158ID wet/dry wipes 3 strips 120-grit non-conductive aluminum oxide sanding cloth 1 instruction card 12/case
HP-T369	Pel-Pac® Kit, 3 saturated towels in sturdy tin 24/case
HP-T369/S	Pel-Pac® Kit with sandpaper 24/case
HP-T369/S-D	Pel-Pac® Kit with sandpaper and dry towel 24/case
DT-1212	Non-linting, 12" X 12" dry towels 100/box
DT-69	Non-linting, 6" X 9" dry towels 200/box

**Government NSN # 6850-01-387-4567 for HPY-12*

Makers of Polywater® and Dyna-Blue® Cable Lubricants and Pull-Planner™ Software

American Polywater® Corporation

11222 60th St. N
Stillwater, MN 55082
U.S.A
1-800-328-9384
1-651-430-2270
http://www.polywater.com(URL) support@polywater.com(e-mail)

Type RP™ SOLVENT

ELECTRICAL CLEANER & DEGREASER

- Fast Evaporating
- No Residue
- Non-Chlorinated
- Non-Conductive
- Excellent Solvency
- High Dielectric Strength of 56 kV

FAST EVAPORATING!

Type RP™ is a fast evaporating cleaner with excellent solvency properties. Type RP™ does not contain chlorinated solvents. Type RP™ will clean semi-conducting cable shield, corrosion inhibiting compound, silicone greases, filling gels, transformer oils and many other contaminants found in electrical cleaning. It is compatible with most materials.

Type RP™ is available in convenient pre-saturated towelettes and cable prep kits. Pre-saturated wipes are a great option for field use. The towels are durable and non-linting. The pouch package limits vapor exposure and eliminates spill and splash hazards.

RP™ passes IEEE 1493, Guide for the Evaluation of Solvents Used for Cleaning Electrical Cables and Accessories.

Catalog #	Description	Units/Case
RP-1	Saturated 5” x 8” wipe in sealed pouch	96
RP-1L	Saturated 8” x 12” wipe in sealed pouch	144
RP-P63	Cable Preparation Kit containing (6) 5” x 8” saturated wipes & 3 strips of 120-grit non-conductive aluminum oxide sanding cloth, and 1 instruction card	12

Not available in bulk packaging

To view technical information on our website go to:

Support Page: **www.polywater.com/typerp.html**

American Polywater® Corporation

phone: 1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
email: support@polywater.com
11222 60th Street North, Stillwater, MN 55082, U.S.A

ADHESIVES | **CLEANERS** | LUBRICANTS | SEALANTS WWW.POLYWATER.COM

LIT-RPFLYER/REV000

Type RP™
Rapid Power Cleaner

American Polywater® Corporation

TECHNICAL DATA SHEET

Description:

Type RP™ Cleaner effectively cleans semi-conducting cable shield, corrosion inhibiting compound, silicone greases, filling gels, transformer oils and many other contaminants found in electrical construction and maintenance.

Type RP™ Cleaner evaporates quickly and does not leave a residue. Type RP™ has excellent dielectric properties and is non-conductive. Type RP™ Cleaner is compatible with most materials and plastics, including polycarbonate.

Type RP™ Cleaner is available in convenient pre-saturated towelettes. Use of individual towels limits solvent exposure and eliminates spill hazard.

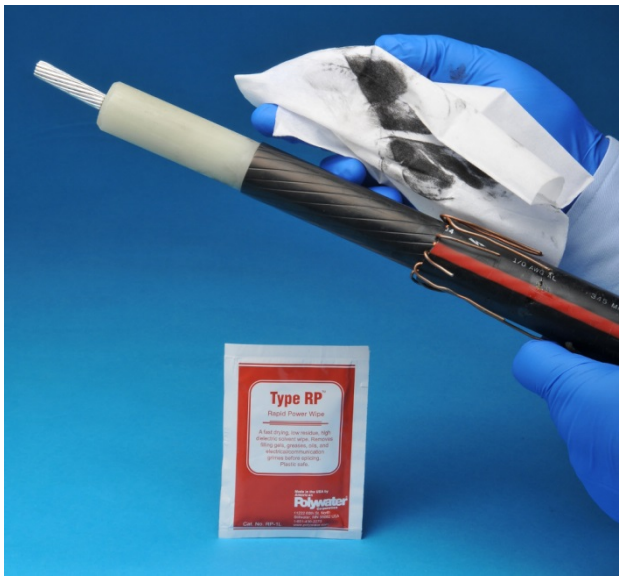
Cleaning Properties:

Type RP™ Cleaner meets IEEE 1493 performance criteria[1]. It effectively cleans semi-conducting cable shield. A towel saturated with cleaner quickly removes the compound and becomes visibly black. Type RP™ Cleaner dissolves a broad range of contaminants.

Type RP™ Cleaner has excellent solvency across a broad spectrum of grimes. Contaminant grease is spread onto a polyethylene plaque with 6 mm thick ribbons. The plaque is immersed in RP™ Cleaner and agitated. Cleaning time is noted.

Contaminant	Cleaning Time
Silicone Grease, DC #4	<60 seconds
Dielectric Oil	<30 seconds
Hydrocarbon Grease	<30 seconds
Aluminum Oxide Grease	<60 seconds

[1] Tested using methods from IEEE 1493, "Guide for the Evaluation of Solvents Used for Cleaning Electrical Cables and Accessories."



Type RP™ Rapid Power is fast evaporating and effective

Product Benefits:

- Fast Evaporation
- Excellent Solvency
- No Residue
- Non-Conductive
- Contains No Chlorinated Solvents
- Compatible with Most Plastics and Rubbers

End Use:

- Splicing and Terminating Cables
- Cleaning Relays, Generators, Motors, Circuit Boards and other Electrical Equipment
- Maintaining Transformers and Switch Gear
- Preparing Surfaces for Adhesives, Sealants and Tapes

Performance Properties:

Property	Result
Cleaning Effectiveness	Excellent
Dielectric Strength 100 mil gap (ASTM D877):	56 KV
Evaporation Rate	Fast (similar to alcohol)
Residue (ASTM D2369)	<100 ppm (None)

Usage Directions:

To prepare cable for splice, buff the insulation with the abrasive strip to remove any conductive material remaining on the insulation. The surface should be smooth with no particle contaminants.

Clean the cable insulation with the Type RP™ Cleaning Wipe. Wipe away from the conductor towards the insulation shield. Turn the solvent towelette after each wipe, using a fresh portion of the towel each time. It is important not to wipe material from the insulation onto the insulation shield. Do not wipe the insulation shield. RP™ Cleaning Wipes can also be used to clean the cable jacket for improved adhesion of mastics and tapes used in splicing and termination.

For general electrical cleaning, follow manufacturers' instruction. RP™ Cleaning Wipes are fast evaporating. Do not open until ready to use.

Environmental Impact:

Type RP™ Cleaner is a safer alternative to chlorinated solvents.

Property	Result
VOC Content	720 grams/liter
Global Warming Potential	Does not contain global warming compounds
Ozone Depletion Potential	None
CFC, HCFC, HFC Content:	None
RCRA	Not regulated as hazardous waste
CERCLA/SARA Status	Not regulated as a hazardous substance

Safety:

Type RP™ Cleaner has a low level of toxicity and does not contain any listed carcinogens. It is flammable and should not be exposed to fire or flame. Towelette package limits hazard. Good industrial hygiene practice and appropriate precautions should be employed during use. See SDS for specific details.

PEL-PAC® System

Type RP™ Cleaner pre-saturated towelettes are a convenient package with multiple safety benefits.

Control
Pre-saturated wipes minimize solvent exposure on sensitive electrical parts. Directly spraying or immersing the part allows the solvent to puddle into small openings. Wipe cleaning will also ensure that the solvent evaporates more quickly.

Safety
The pre-saturated towelette package eliminates spill hazard and limits solvent vapor exposure. Wipes contain a carefully measured quantity of solvent and are an excellent way to control vapor. Type RP™ Cleaner pre-saturated towelettes are a great choice for underground or confined space applications.

Convenience
Each PEL-PAC® package utilizes non-linting, non-tearing towels. Clean wipes are always available, eliminating recontamination of parts with dirty rags.

Convenient pre-saturated towelettes (RP-1L, RP-1) control solvent exposure.

Physical Properties:

Type RP™ Cleaner is a high-purity solvent with low aromatic content.

Property	Result
Flashpoint (ASTM D93)	19°F (-7°C)
Initial Boiling Point	144°F (62°C)
Specific Gravity	0.72

Compatibility:

Type RP™ Cleaner is compatible with most plastics and rubbers. It meets standard electrical utility test requirements based on IEEE 1493.

Plastic Materials - LLDPE
LLDPE jacket material immersed in Type RP™ Cleaner retains tensile and elongation characteristics and shows minimal weight change[1].

Rubber Materials – EPDM and Silicone Rubber
Platen samples of EPDM and Silicone Rubber immersed in Type RP™ Cleaner retain tensile and elongation characteristics and show minimal weight change[1].

Volume Resistivity of Cable Insulation Shield
Cables with either XLPE or EPR insulation show acceptable volume resistivity values after immersion in Type RP™ Cleaner [1]. After exposure to the cleaner, volume resistivity measurements return to control levels.

Corrosivity:
Type RP™ Cleaner will not corrode or stain metal parts. It does not tarnish or corrode copper[2].

Polycarbonate:
Injection-molded plaques of polycarbonate are cut into bars, and bent in a three-point fixture. "Strain limit" is the greatest percent strain where no stress cracking occurs. A strain limit greater than 0.5% indicates strain resistance.

Strain Limit > 0.5% (Stress Crack Resistant)[3]

[1] Tested using methods from IEEE 1493, "Guide for the Evaluation of Solvents Used for Cleaning Electrical Cables and Accessories."

[2] Testing based on ASTM D130, "Standard Test Method for Detection of Copper Corrosion from Petroleum Products by the Copper Strip Tarnish Test."

[3] Testing based on Mobay Corporation, Plastics and Rubber Division, "Chemical Compatibility Test for Unreinforced Thermoplastic Resins, 1989."

Soak Testing:

Materials are immersed in Type RP™ Cleaner for 7 days at 22°C (72°F). Some rubbers will swell, but should return to their original state once the cleaner evaporates. Wipe cleaning minimizes solvent exposure.

Plastics	% Weight Change	Appearance
ABS	+4.09	NC
Acrylic	+0.59	SS
Delrin®	+0.07	NC
Epoxy	+1.77	NC
Nylon 66	+0.16	NC
Nylon 101	+0.14	NC
Polycarbonate	+0.09	NC
Phenolic	+6.64	NC
Noryl	+0.63	NC
PVC	+0.43	NC
Teflon®	+0.01	NC
Tygon®	-1.26	NC
Ultem® 1000	-0.04	NC
Valox® 420	+0.01	NC
HDPE	+2.39	NC
LDPE	+4.95	NC
SAN	+0.00	NC

Elastomers	% Weight Change	Appearance
Neoprene®	-12.48	H
Nitrile	-4.93	NC
SBR	-9.15	NC
Viton®	+2.52	NC
Natural Rubber	+0.25	NC
EPDM	-26.56	H

KEY:

NC = No Change
S = Swelling
ES = Extreme Softening
C = Crazing
SS = Slight Swelling
H = Hardens

Testing based on ASTM D543, "Standard Test Method for Resistance of Plastics to Chemical Reagents."

Model Specification:

The statement below may be inserted into a customer specification to help maintain engineering standards and ensure work integrity.

The cleaner shall not leave a residue. The cleaner shall not significantly affect the volume resistivity of Union Carbide 0691 XLPE cable insulation shield. The cleaner shall show a voltage withstand of at least 40 kV before breakdown.

The cleaner shall not significantly affect the tensile and elongation properties of XLPE, silicone rubber, and EPDM rubber when tested to guidelines proposed in IEEE P1493. When wiped over an XLPE (Union Carbide Type 0691) insulation shield, a clean towel wetted with the cleaner shall become visibly "black" with two wipes over 2-inches of cable length with light hand pressure.

The cleaner shall not be a carcinogen or listed by CERCLA as a hazardous waste. It shall not be on the EPA Phase I or Phase II list of banned or phased-out chlorofluorocarbons.

Order Information:

Cat #	Package Description
RP-1	Single, saturated towelette (5"X8") 96/case
RP-1L	Single, slightly saturated towelette (8"X12") 144/case
RP-P63	Cable Preparation Kit includes: 6 RP-1 wipes 3 Strips 120-grit, non-conductive aluminum oxide sanding cloth 1 Instruction card 12/case

LIT-RPTECHSPEC/REV000.

Makers of Polywater® and Dyna-Blue® Cable Lubricants and Pull-Planner™ Software

American Polywater® Corporation

11222 60th St. N
Stillwater, MN 55082
U.S.A
1-800-328-9384
1-651-430-2270
http:/www.polywater.com
support@polywater.com(e-mail)

ELECTRICAL MAINTENANCE AEROSOLS FROM AMERICAN POLYWATER

TR™ Cable Cleaner

- Powerful All Purpose Cleaner
- Closely Matches Trichlor's Characteristics
- No Flash Point, Non-Flammable
- Non Chlorinated, No Carcinogens
- Fast Evaporating

KC™ Contact & Equipment Cleaner

- No Flash Point, Non-Flammable
- Safe On Plastics
- Fast Evaporating
- No Carcinogens
- Cleans Relays, Contacts, & Cables

HP™ Multipurpose Cleaner/Degreaser

- Excellent Cable Cleaner
- High Flash Point
- Non-Chlorinated, Ozone Safe
- Longer Working Time

FD™ Electrical Degreaser/Contact Cleaner

- Fast Drying, Leaves No Residue
- Removes Contamination, Safe on Cables, Circuit Boards & Contacts
- Superior Solvency Power
- Non-Chlorinated, No Carcinogens

P7™ Multipurpose Oil

- Lubricates, Penetrates, Cleans
- Displaces Water, Seals out Moisture
- Extends Equipment Life
- Safe On Plastics

CG™ Cold Galvanize

- Prevents Rust & Corrosion
- Protects Steel Electrical Apparatus
- Excellent for Weld Coating
- Plastics Safe

Aerosol Ordering Matrix

Catalog #	Description	Units/Case
CG-13	16-oz aerosol can	12
FD-9	16-oz aerosol can	12
FD-35LF	32-oz bottle with flip top	12
FD-128	1-gallon jug	4
FD-640	5-gallon pail	1
FD-DRUM	55-gallon drum	1
HP-1	Saturated wipe in foil pack	144
HP-P158ID	Wet/Dry wipe Tandem Pack™	144
HPY-12	16-aerosol can	12
HP-16LF	16-oz bottle with flip top	12
HP-35LF	32-oz bottle with flip top	12
HP-128	1-gallon jug	4
HP-640	5-gallon pail	1
HP-DRUM	55-gallon drum	1
KC-16	16-oz aerosol can	12
P7-12	16-oz aerosol can	12
TR-1	Saturated 5”x8” wipe in sealed foil pouch	96
TR-1L	Saturated 8”x12” wipe in sealed foiled pouch	144
TR-16	16-oz aerosol can	12

To view technical information on our website go to:
Support Page: www.polywater.com/aerosols.html

American Polywater® Corporation

phone: 1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
email: support@polywater.com
11222 60th St. N., Stillwater, MN 55082, U.S.A

LIT-MROFLYER/REV0001

Technical Bulletin

American Polywater's

P7™

Multipurpose Oil

Multipurpose Penetrating Oil for Industrial and Electrical Use

---

Description

P7™ Multipurpose Oil is suitable for all kinds of electrical and industrial uses. P7™ Oil cleans dirt and grime, loosens rust and scale, and penetrates frozen parts. Use it to maintain and lubricate equipment.

P7™ Multipurpose Oil is multi-functional. It cleans, penetrates, and lubricates to extend equipment life. P7™ Oil also acts as a moisture displacer and corrosion inhibitor. It drives out moisture and dries wet connections, leaving a protective film which is non-conductive.

Advantages

- Lubricates Moving Parts
- Frees Stuck Parts
- Protects Against Rust and Corrosion
- Displaces Moisture
- Removes Grime and Rust
- Film is Non-Conductive
- Harmless to Most Plastics
- Safe on Metal, Paint, & Rubber
- Contains No CFC's or Chlorinated Solvents
- Silicone-Free
- Cleans Tar, Grease, Rust, and Adhesives

Properties

Flashpoint (ASTM D93)	100°F/38°C
Initial Boiling Point	245°F/118°C
Specific Gravity	0.69
Dielectric Strength (ASTM D877)	13 KV
Relative Evaporation Rate	Fast
Propellant	Hydrocarbon
USDA	Approved

P7™
Multipurpose Oil Aerosol (cat. # P7-12) penetrates into tight spots and frees stuck parts.

Penetration and Cleaning

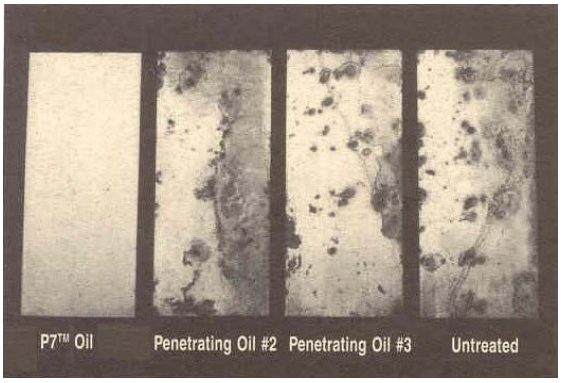
P7™ Multipurpose Oil cleans grease and tars and removes adhesives and rust. Other solvent cleaners are not necessary. P7™ Oil dissolves grit and grime contaminants, leaving behind a fine protective film.

P7™ Multipurpose Oil has a low surface tension, which allows it to spread into a very fine film. One 12-ounce can of P7™ Oil will cover approximately 300 square feet of surface. This low surface tension allows P7™ Oil to "creep" up surfaces against gravity. It will penetrate and coat 16mm of a threaded bolt in 15 minutes. P7™ Multipurpose Oil will lubricate tight crevices and loosen frozen parts.

Protection and Corrosion Prevention

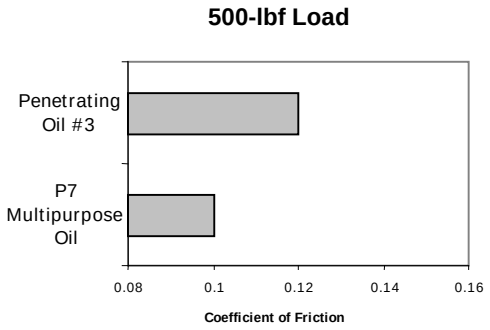
P7™ Multipurpose Oil offers superior corrosion protection by leaving a non-conductive film. This long-lasting film increases service life.

The photo below shows the results of a three-week outdoor weathering test run on low carbon steel. The plates were sanded, cleaned, and saturated with various penetrating oils. The steel plates were left in the elements, untouched for three weeks. P7™ acts as a tough, protective barrier; the steel plate has no rusting or mottling at the conclusion of the test.



Lubrication

P7™ Multipurpose Oil is an exceptional lubricant. The coefficient of friction can be determined using the Falex Pin and Vee Block Test Machine (ASTM D3233A). Load is applied to two V-blocks which press against a rotating steel journal immersed in the oil. The coefficient of friction value is derived from the torque measurement on the pin. The more the penetrating oil lubricates and lowers the torque, the lower the resulting coefficient of friction. Results documented in the following chart show that P7™ has a significantly lower coefficient of friction than another commonly used multipurpose oil.



Extreme pressure testing using the Pin and Vee Block Test Machine confirms P7™ Oil's excellent performance under high loads. The test will run to a load force of over 1,000 pounds before failure.

Water Displacement

P7™ Multipurpose Oil displaces moisture and dries out ignitions. It creeps under water and ice, dissolving and carrying away these contaminants. A non-conductive, protective film is left behind. P7™ Oil displaces water according to the procedure described in Mil-Spec C-16173E. No rusting or mottling was observed on the treated surface.

Compatibility

P7™ Multipurpose Oil is compatible with most plastics and elastomers. Tables I and II show the effect of P7™ Oil on various plastics and rubbers.

Testing is based on a soak test described in ASTM D 543. P7™ Oil will temporarily affect some rubber compounds. These rubbers may swell, but should return to their original state after the solvent carrier has dried. Immersion will affect sensitive materials more than incidental contact of a spray and wipe. It is recommended that all plastic parts, gaskets, seals and O-rings be tested for specific use and exposure method.

P7™ Compatibility with Plastics and Elastomers

TABLE I

PLASTICS	AGING 72 HOURS AT 50°C		
	% WEIGHT CHANGE	% THICKNESS CHANGE	APPEARANCE
ABS	+0.04	+0.79	NC
Acrylic	-0.02	-0.04	NC
CPE Thermoplastic	+16.10	+4.27	NC
CPE Thermoset	+22.12	+20.99	SS
Delrin®	+0.17	+0.25	NC
Epoxy	-0.05	0	NC
Nylon 101	-0.08	-1.57	NC
Polycarbonate	-0.03	-0.59	NC
Phenolic	+1.24	0	NC
Polyethylene	+14.19	+5.44	NC
Polystyrene	+13.85	-3.64	SF
PVC	+0.06	0	NC
Teflon®	+0.07	-0.25	NC
Tygon®	+4.95	0	NC
Ultem® 1000	-0.08	-0.27	NC
Valox® 420	+0.03	-1.11	NC

TABLE II

ELASTOMERS	AGING 72 HOURS AT 50°C		
	% WEIGHT CHANGE	% THICKNESS CHANGE	APPEARANCE
EPDM	+149.56	+43.77	S
Neoprene	+26.64	+9.79	SS
Nitrile	+1.06	0	NC
SBR	+52.48	14.36	S
Silicone	+48.04	+17.87	S
Viton®	+0.56	+0.26	NC

KEY:

NC=NO CHANGE
SS=SLIGHT SWELLING
SF=SOFTENING
S=SWELLING

Usage Directions

Position nozzle 6 to 8 inches (15-20 cms) from surface and spray with light even strokes. Use extension tube for difficult to reach areas. Let P7™ Oil soak for several minutes to loosen rusted parts. Allow 4 to 6 hours to fully dry. P7™ Multipurpose Oil leaves a non-conductive, protective film.

Safety

P7™ Multipurpose Oil has a low level of toxicity. Avoid breathing spray, mist, or vapor. As with any solvent, ventilation should be sufficient to keep vapors at safe levels.

P7™ Multipurpose Oil is combustible. Do not expose to fire or flame. Good industrial hygiene practice and appropriate precautions should be employed during use.

Storage

P7™ Multipurpose Oil is classified as combustible. Keep containers cool, dry and away from sources of ignition and oxidizing materials. Do not expose aerosol cans to direct sunlight or temperatures above 120°F (50°C). Do not puncture or incinerate aerosol cans. Aerosol cans are freeze/thaw stable. This product has a shelf life of three years.

Package Options

Catalog No.	Description
P7-12	10-wt. oz. aerosol can in 16 oz can

American Polywater® Corporation

11222 60th St. N
Stillwater, MN 55082
U.S.A

support@polywater.com
www.polywater.com(URL)

1-800-328-9384
1-651-430-2270
fax 1-651-430-3634

LIT-P7TECHB/REV000)

American Polywater® Corporation

5630 Memorial Ave. Ste 2 (Office)
11222 60th Street North (Plant)
P.O. Box 53 (Mailing)
Stillwater, Minnesota 55082 U.S.A.

Telephone: 1-651-430-2270
FAX: 1-651-430-3634

www.polywater.com
custserv@polywater.com

July 27, 2004

Specification
CG™ Cold Galvanize
(CG-13)

CG™ Cold Galvanize is an organic zinc rich coating for steel and ferrous metals that combines the resistance properties of an epoxy and the galvanic properties of zinc. This high performance epoxy compound fuses zinc to the metal substrate and protects against corrosion equal to Hot Dip Galvanizing. CG™ Cold Galvanize is self-healing and prevents creepage even when the surface has been penetrated or scratched. After curing, CG™ Cold Galvanize may be coated with conventional primers and finishes.

FEATURES

- 95% Organic Zinc in Dry Film
- Long Term Corrosion Protection
- Meets Mil Specifications

SPECIFICATIONS	
Appearance	Gray/Matte Finish
Coverage	10 – 15 Square Feet per Aerosol Can (CG-13)
Dry Film Thickness	1.0 to 3.0 mils (.025mm - .075mm)
Zinc Content	95% in Dry Film
Drying Time	To Handle – 30 minutes @ 70˚F (21˚C) To Topcoat – 3 hours @ 70˚F (21˚C)
Temperature Resistance	250˚F (121˚C) – Sustained, 300˚F (149˚C) - Intermittent
Weldable	Yes
Mil Specifications & Certifications	P-26915A - Type 1 Class A primer for Steel (USAF) DOD-21035A - Zinc Rich Galvanize Repair P-46105 - Weld through Zinc Rich Primer Salt Fog - Pass 1,000 Hours (ASTM B117) Humidity - Pass 500 Hours (ASTM D2247)

SURFACE PREPARATION

New Steel: Surface must be dry and free of contamination. Remove all weld splatter and grind all rough welds to a smooth contour. For severe exposure (immersion, chemical, etc.) near-white blast clean per SSPC SP 10-63T. For other exposures, blast clean per SSPC SP 6-63 to a maximum profile of 1.5 mils (.038mm).
Previously Painted Surfaces: Must be free of oil, grease, and other contamination. For best results, spot blast exposed areas to be coated. Power tool brushing may be used for minor touch-up.

PROPERTIES	
Specific Gravity	1.19
Solids by Weight	43%
VOC Lb/Gallon (Kg/L)	5.6 Lbs/Gallon (0.67Kg/L)
Flash Point	-156˚F (-104˚C) TCC for Aerosol
Shelf Life	24 months
APPLICATIONS	
Recommended Film Thickness	1.0 to 3.0 mils (.025mm - .075mm)
Cure Time	30 to 40 minutes. Air Dry

USAGE INSTRUCTIONS

Surface shall be dry, 5˚F (3˚C) above the dew point, with air temperatures greater than 50˚F (10˚C). Surface must be free of rust bloom. Shake can vigorously until agitator frees. Spray using light, even strokes about 18 inches (1/2 meter) from surface. Several thin coats are recommended. Allow 15 minutes drying time between coats. Final coat should dry thoroughly (up to 24 hours). To avoid clogging nozzle, invert can and spray until only air escapes.

CONTAINS

Zinc Dust (CAS 7440-66-6), 2-Butanone (CAS 78-93-3), Xylene, Mixed Isomers (CAS 1330-20-7), Ethyl Benzene (CAS 100-41-4), VMP Naptha-66 (CAS 64742-89-8) and Propane (CAS 74-98-6).

CAUTION

Keep away from Heat, Sparks, Open flames, Electrical equipment, etc. DO NOT MIX WITH WATER OR USE WATER FOR FIRE. (See MSDS Sheet).

American Polywater's

Technical Bulletin

FD™

Electrical Contact Cleaner

A Fast-Drying Cleaner for General Industrial and Maintenance Use

Description

FD™ Electrical Contact Cleaner is a fast drying, multi-purpose industrial and maintenance cleaner. It replaces ozone-depleting CFC's, trichloroethane, HCFC's, perchloroethylene and other carcinogenic chlorinated solvents. FD™ Electrical Contact Cleaner effectively dissolves industrial grimes, greases, lubrication fluids, silicone, tars, adhesives, and fluxes.

FD™ Electrical Contact Cleaner evaporates quickly without a residue. It is suitable for use in electrical maintenance as a replacement for 1,1,1-trichloroethane. Transformer oils, corrosion inhibitor compounds, silicone grease, semi-conducting paints, and many other kinds of electrical grime clean up quickly with Type FD™ Cleaner.

Typical Physical Properties

Dielectric Strength (ASTM D877)	36 KV
Relative Evaporation Rate	Fast
Residue (ASTM D 2369)	< 100 ppm
Flashpoint (ASTM D 56)	~ 20°F/-5°C
Initial Boiling Point	141°F/60°C
Specific Gravity	0.69
Percent Aromatics	< 0.1%
Propellant (aerosol only)	CO_2
Cleaning Strength	Excellent

Advantages

- Multiple packages to fit different end uses
- Fast evaporating
- Good general solvency power
- One cleaner for many needs
- Contains no CFC's or HCFC's
- Contains no chlorinated solvents
- Harmless to most plastics
- Non-conductive, non-corrosive, non-staining

FD™ Electrical Contact Cleaner aerosol (cat. # FD-9) has a variable spray head (low, medium, high) for better spray control.

Usage Directions/Performance

FD™ Electrical Contact Cleaner is suitable for many types of cleaning and degreasing, including contact cleaning and electrical maintenance cleaning. It can be used as a spray, wipe, or solvent rinse. FD™ Cleaner is effective at room temperature. It does not freeze and can be used in cold weather applications. FD™ Electrical Contact Cleaner is authorized by the USDA for use in federally inspected meat and poultry plants.

FD™ Cleaner has good solvency power. Cleaning time and effectiveness will vary based on the contaminant and cleaning method. Wiping or agitation speeds the cleaning. Experiment with your particular contaminant and conditions.

A comparison of FD™ Cleaner to other solvent types is charted below. A stainless steel surface is coated with 50 mils of contaminating compound. The surface is immersed and lightly agitated in FD™ Cleaner. The time at which the contaminant has dissolved is noted.

Silicone Electrical Insulating Compound	
Cleaner	**Cleaning Time**
FD™ Electrical Contact Cleaner	<2 Minutes
Odorless Mineral Spirits	5 Minutes
Isopropyl Alcohol	>5 Minutes

Hydrocarbon Lubricating Grease	
Cleaner	**Cleaning Time**
FD™ Electrical Contact Cleaner	<3 Minutes
Odorless Mineral Spirits	>5 Minutes
Isopropyl Alcohol	>>5 Minutes

Cable Filling Grease (PE/PJ)	
Cleaner	**Cleaning Time**
FD™ Electrical Contact Cleaner	5 Minutes
Odorless Mineral Spirits	>5 Minutes
Isopropyl Alcohol	>>5 Minutes

Oxide Inhibiting Compound	
Cleaner	**Cleaning Time**
Type FD™ Cleaner	<1 Minutes
Odorless Mineral Spirits	<2 Minutes
Isopropyl Alcohol	>>5 Minutes

FD™ Electrical Contact Cleaner contains no surfactants and leaves no residue once dried. For precision cleaning (residue free use), prevent recontamination with existing grime by finishing with a fresh wipe, spraying until the solvent runs clear, or rinsing in a fresh bath of FD™ Cleaner.

FD™ Electrical Contact Cleaner is fast evaporating and does not require forced air to dry. In areas where solvent has pooled, the part may be wiped with an absorbent, lint-free towel.

Evaporation Rate

FD™ Electrical Contact Cleaner:	40 mg/min.
111 Trichloroethane:	50 mg/min.
Perchloroethylene:	20 mg/min.
Isopropyl Alcohol:	10 mg/min.
Odorless Mineral Spirits:	.3 mg/min.

Compatibility

FD™ Electrical Contact Cleaner will not corrode or stain metal parts. It does not tarnish or corrode copper per ASTM D130 and D1729.

FD™ Electrical Contact Cleaner is compatible with most plastics and elastomers. Tables I and II show the effect of FD™ Cleaner on various plastics and rubbers.

Testing, shown in charts I and II, is based on a soak test described in ASTM D543. FD™ Cleaner may temporarily swell some rubber compounds. These rubbers should return to their original state after the cleaner has evaporated. Immersion will affect sensitive materials more than incidental contact of a spray or wipe. It is recommended that all plastic parts, gaskets, seals and O-rings be tested for specific use and exposure method.

FD™ Solvent Compatibility with Plastics and Elastomers

TABLE I

PLASTICS	AGING 72 HOURS AT 50°C		
	% WEIGHT CHANGE	% THICKNESS CHANGE	APPEARANCE
ABS	+0.81	0	NC
Acrylic	+0.06	+0.15	NC
CPE Thermoplastic	+6.49	0	NC
CPE Thermoset	-6.51	0	NC
Delrin®	+0.24	0	NC
Epoxy	+0.08	0	NC
Nylon 101	+0.70	+0.27	NC
Polycarbonate	+0.18	0	NC
Phenolic	+6.99	+9.00	NC
Polyethylene	+12.46	+3.78	NC
Polystyrene	+31.49	+33.12	SF
PVC	-0.03	0	NC
Teflon®	+0.07	0	NC
Tygon®	-0.17	+6.62	NC
Ultem® 1000	-0.08	+0.27	NC
Valox® 420	+0.10	+1.12	NC

TABLE II

ELASTOMERS	AGING 72 HOURS AT 50°C		
	% WEIGHT CHANGE	% THICKNESS CHANGE	APPEARANCE
EPDM	+100.88	+37.15	S
Neoprene	+2.36	+2.72	NC
Nitrile	+2.00	+5.26	NC
SBR	+16.96	+31.53	SS
Silicone	+65.97	+47.50	S
Viton®	+1.98	+4.43	NC

KEY:
NC = NO CHANGE
S = SWELLING
SS = SLIGHT SWELLING
SF = SOFTENING

FD™ Cleaner is a trademark of American Polywater Corporation
Delrin®, Teflon®, and Viton® are trademarks of Du Pont
Ultem® 1000 and Valox® 420 are trademarks of G.E. Plastics
Tygon® is a trademark of Norton Performance Plastics

Safety

FD™ Electrical Contact Cleaner has a low level of toxicity. As with any solvent, ventilation should be sufficient to keep vapors at safe levels. Avoid eye contact and excessive skin contact. Wash hands with soap and water after using.

FD™ Electrical Contact Cleaner is an extremely flammable liquid. It should not be used on energized equipment. FD™ Electrical Contact Cleaner should not be used for high temperature cleaning or exposed to pilot lights, flames or heated surfaces. Good industrial hygiene practice and appropriate precautions should be employed during use. See SDS for specific details.

Storage

FD™ Electrical Contact Cleaner is classified as flammable. Keep containers cool, dry and away from sources of ignition and oxidizing materials. Do not expose aerosol cans to direct sunlight or temperatures above 120°F. Do not puncture or incinerate aerosol cans.

Package Options

Catalog No.	Description
FD-9	9-wt. oz. aerosol with adjustable nozzle (16 oz can) (12/cs)
FD-16LF	16-fl. oz. bottle with flip top (12/ cs)
FD-35LF	1-quart bottle with flip top (12/cs)
ST-R	Trigger sprayer fits pt. & qt. Bottles (12/cs)
FD-128	1-gallon can (4/cs)
FD-640	5-gallon pail (1 ea).
FD-Drum	55-gallon drum (1 ea)

LIT-FDTECHB/REV000

Makers of Polywater® and Dyna-Blue® Cable Lubricants and Pull-Planner™ Software

American Polywater® Corporation

11222 60th St. N
Stillwater, MN 55082
U.S.A
1-800-328-9384
1-651-430-2270
fax 1-651-430-3634
www.polywater.com(URL) support@polywater.com(e-mail)

American Polywater's

Grime-Away™

Multi-Purpose Cleaning Wipes

Heavy duty towelettes are pre-moistened with a multi-purpose cleaning solution.

Towels feature a textured side to quickly remove greases and a soft side to be gentler on skin.

Moisturizes and softens hands while cleaning tools and surfaces.

Safe for cleaning hands that contact insulated gloves.

American Polywater's Grime-Away Multi-Purpose Cleaning Wipes

Quickly Removes:

- Transformer oils
- Cable gels
- Silicone greases
- Dirt/Soil
- Tar/Asphalt
- Gray and black oxide inhibitors
- HDD pipe thread grease
- Adhesive
- Caulk
- C Cement

Use On:

- Tools
- Work Surfaces
- Machinery
- Skin
- Equipment
- Service Vehicle

Safety:

Grime-Away™ is tested and approved for compatibility with rubber insulating gloves. Salisbury by Honeywell used their "Criteria for Evaluating Chemicals in Contact with Salisbury Natural Rubber Lineman Equipment" to determine the affect of Grime-Away™ on skin contact with insulating gloves. Salisbury approves Grime-Away™ for cleaning hands which then contact insulating gloves (not for use on the gloves themselves).

Catalog #	Description	Units/Case
HTC-D72	Dispenser with 72 10" x 12" pre-moistened wipes	6 per case
HTC-1	Individual saturated 8" x 12" pre-moistened wipe	144 per case

To view technical information on our website, go to:
Competitive Cleaning Wipe Chart: **www.polywater.com/grimeawaychart.asp**

American Polywater® Corporation

phone: 1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
email: support@polywater.com
11222 60th St. N., Stillwater, MN 55082, U.S.A

ADHESIVES | **CLEANERS** | LUBRICANTS | SEALANTS WWW.POLYWATER.COM

SALISBURY
by Honeywell

Ref: Evaluation of the Effect of GRIME AWAY on Salisbury Class 2 Lineman Gloves:

A sample of Grime Away was evaluated for its effect on Salisbury Lineman Gloves Class 2 (red/black), using the in-house test protocol "Criteria for Evaluating Chemicals in Contact with Salisbury Natural Rubber Lineman Equipment".

Based on the results for this test, the following statement can be used to describe the use conditions of this material: -

"GRIME AWAY has only minor affects on the aged tensile strength and should not harm Salisbury Natural Rubber Lineman Equipment under normal conditions of use. Such conditions include minimal contact between the wipes and the Salisbury Natural Rubber Lineman Equipment. Salisbury Natural Rubber Lineman Equipment should also be cleaned after exposure".

The results of the tests are shown below: -

Physical Properties:

	Tensile (psi)		500% Modulus (psi)		Elongation (%)		Area Swell (sq.mm)	
	RT	Aged	RT	Aged	RT	Aged	RT	Aged
Original	4136	4604	1362	1474	710	720	650	650
Exposed	4212	4869	1360	1432	730	730	650	650
% Diff	+ 1.8	+ 5.8	- 0.1	- 2.8	+ 2.8	+ 1.4	0.0	0.0

Electrical Properties:

	Dry Electricals		Soak Electricals	
	Breakdown (kV)	Leakage (mA)	Breakdown (kV)	Leakage (mA)
Original	30.0	11.0	30.0	11.0
Exposed	30.0	11.0	30.0	11.0
% Diff	0.0	0.0	0.0	0.0

A copy of the procedure and acceptance limits is available on request.

Barry Richards BSc (Hons)
Laboratory and Development Manger 4/29/09

CLEAN = SAFE

Live Line, Insulating, Rubber Goods Maintenance Products Meet OSHA Live-Line Tool Standards

S-1™ Hot Stick Wipe

The S-1™ Hot Stick Wipe cleans hot stick and treats with a water repellent as part of daily stick maintenance. Meets OSHA regulation 29 CFR part 1910.

- Convenient, Pre-Saturated, Lint-Free Wipe
- Dual Action - Cleans and Applies Water Repellent Film
- Does Not Remove or Adversely Affect Gloss Coat
- Evaporates Quickly
- No "Build-Up" Over Time
- Prevents Continuous Water Film on Stick in Wet Weather
- Removes Grease, Dirt, and Grime
- Designed for One-Time Use
- Meets IEEE Maintenance Recommendations (Std #978)
- Disposal Helps Compliance with OSHA Reg 1910.269 Part J

To view technical information go to:
Support Page: **www.polywater.com/hotstick.html**
Application Videos: **www.polywater.com/videos.asp**

Catalog #	Description	Units/Case
S-1	Saturated towelette	144

Insulated Fiberglass Boom Cleaners

The pre-wash wipe is a cleaner-saturated towel that cleans grease, tar, insects, creosote, salt spray, pine pitch, hydraulic fluid and road debris off fiberglass boom arms. The cleaner is water soluble, and washes off during subsequent water rinsing. Boom pre-wash does not adversely affect the gel coat on the boom. Available for use in a 72-count towelette canister or an individually saturated 2-foot-square towel.

The Boom Wash Concentrate is a specially formulated non-butyl water-based liquid that is mixed with water (1 part concentrate to 3-5 parts water) to make a mild water-based boom cleaner. Once rinsed and dried, the boom should be waxed with American Polywater Fiberglass Wax. The wax helps protect the boom's outer layer and ensures that water will bead up.

To view technical information go to:
Support Page: **www.polywater.com/boomwipe.html**
Application Videos: **www.polywater.com/videos.asp**

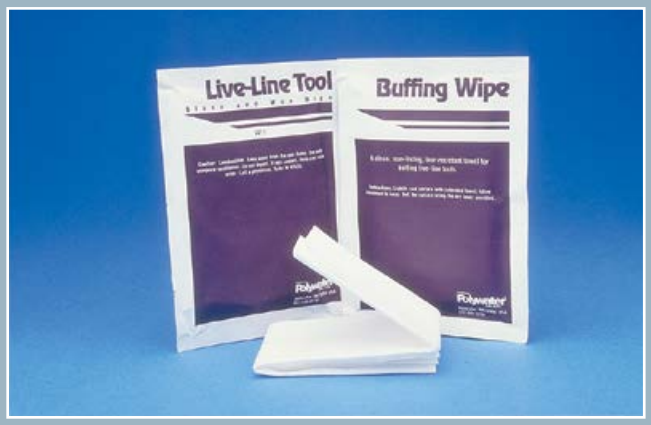
Catalog #	Description	Units/Case
B-1	24" x 24" saturated towel	24
B-D72	72-count saturated wipe dispenser	6
BWC-128	1-gal concentrate	4

Fiberglass Wax & Buff Kit

The Fiberglass Wax and Buff Kit contains a lint-free wipe saturated with a fast-hazing fiberglass wax and a soft lint-free towel for buffing the wax to a shine. This kit is suitable for use on non-conductive fiberglass booms and hot sticks.

The Fiberglass Wax is also available in a 16-oz can, the perfect size for maintaining insulated boom trucks. This wax hazes quickly and buffs easily to a shine. The wax leaves a long-lasting surface barrier that protects the insulated fiberglass booms.

To view technical information go to:
Support Page: **www.polywater.com/waxwipe.html**
Application Videos: **www.polywater.com/videos.asp**



Catalog #	Description	Units/Case
W-1	Wax saturated wipe with Dry Buffing Towel	72
W-16	16-oz. can	12

Polywater® Insulated Rubber Goods Cleaner

Polywater® Rubber Goods Cleaner is a specially formulated water-based cleaner for removing grease, dirt, carbon, creosote, and other grimes from insulating blankets, lineman's gloves, rubber sleeves, jumper cables, hot jumpers, and line-hose. Polywater® Rubber Goods Cleaner is safe for use on all natural and synthetic rubbers.

Unlike other water-based rubber cleaners Polywater® Rubber Goods Cleaner contains no hazardous ingredients and is pH neutral, making it safe for use on skin. Polywater® Rubber Goods Cleaner is also completely biodegradable and safe for the environment.

Polywater® Rubber Goods Cleaner is ready to use and is available in multiple, convenient packages. It works well as a daily cleaner for field use.

- Great pre-wash prior to machine washing
- No mixing required
- Excellent cleaning power
- Harmless to all elastomers (rubbers)
- Multiple package options
- Environmentally friendly
- Non-toxic and non-corrosive
- Not an RCRA-regulated hazardous waste

Catalog #	Description	Units/Case
RBG-D72	72-count saturated wipe dispenser	6
RBG-35LR	1-qt bottle with sprayer	12
RBG-128	1-gal	4
RBG-640	5-gal	1

To view technical information go to:
Support Page: **www.polywater.com/rubber.asp**
Application Videos: **www.polywater.com/videos.asp**

American Polywater® Corporation
phone: 1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
email: support@polywater.com
11222 60th St. N., Stillwater, MN 55082, U.S.A

ADHESIVES | **CLEANERS** | LUBRICANTS | SEALANTS WWW.POLYWATER.COM

BOOM CLEANING GUIDELINES

If you test your aerial truck's dielectric integrity annually, but don't address maintenance between tests, read this article.

Utilities have a variety of programs to maintain the integrity of their boom trucks. Sometimes overlooked is the regular maintenance and cleaning of the fiberglass boom between annual or semi-annual dielectric testing and service. **Who removes the hydraulic fluid, pine pitch, road tar, and other contaminants that build up during the normal exposure of the boom, and how do they do it?**

Dirt accumulated during normal use can affect the dielectric properties of your boom. These include road debris, salt spray, hydraulic fluid, grease, pine pitch, creosote, and more. When residue builds on the boom, water sheets out rather than beading up and running off. This pooling or sheeting of water on dirty booms can keep the booms from meeting dielectric standards and potentially pose a hazard in the field.

What does your company use to clean fiberglass booms? Common degreasers or solvents can actually harm and strip the gel coat on the boom causing weak or soft spots. Many crews have access to solvents and they know how well these solvents remove grease. They may not know the harmful effects solvents can have on the fiberglass portion of the boom arm or bucket. Some cleaners contain abrasives and leave a considerable residue. Others, like acetone, xylene, and toluene, can cause permanent damage if left in contact with the surface for too long a period. These solvents are also flammable and have other hazards. Personnel should be trained on the proper products for use on the boom and bucket areas to keep the truck in proper working order.

Mild, non-abrasive, low-residue soap in warm water is the safest way to clean your boom arms. For the hard-to-remove dirt you need to get off before the washing, try the B-1 Boom Wipe from American Polywater Corporation. The B-1 Wipe is a large towel saturated with a cleaner that will not harm the gel coat or leave a residue, but it does a great job on the contaminants mentioned above. The ready-to-go wipe package is easy for line personnel to keep on the truck for immediate usage. Never use abrasive pads for cleaning tough dirt areas. These pads scratch the boom and remove the protective gel coat layer.

Once your boom is properly cleaned, a good wax is in order to protect the surface and force water beading during misty or wet weather. American Polywater manufactures a specialty fiberglass wax available in pint cans or individual towelettes. All products that are used on your boom truck should be approved by the aerial lift manufacturer. Cleaners and protectants designed specifically for fiberglass booms are recommended.

Companies should follow boom truck manufacturer guidelines on the frequency of dielectric testing, proper cleaning practice, and other maintenance procedures. The ANSI A92.2-1990 Standard (Section 5.4.3) also addresses proper dielectric testing intervals and field inspections for aerial truck testing.

By following manufacturer and industry guidelines on the maintenance of boom trucks, **your aerial fleet will be safer and last longer.**

HOT STICK DAILY USE MAINTENANCE GUIDELINES

IEEE Std 978-1984

4.3 Cleaning and Waxing

Before each use, insulating tools should be wiped with a clean, absorbent paper towel or clean, absorbent cloth and followed by wiping with a silicone treated cloth.

Caution: Do not use cloths that have been washed in harsh solvents, since some residues on the cloth can be deposited on the pole surface.

If simple wiping does not remove the contaminant then apply denatured alcohol with a paper towel or clean, absorbent cloth and follow by wiping with a silicone-treated cloth. Other solvents or cleaners may be used as recommended by the manufacturers of the insulating tools.

Caution: Do not use soap detergents, liquid or powered form such as 409, Fantastic, Comet, ND-150, Bon-Ami, Ajax, etc., to clean fiberglass tools under field conditions because of the following problems:

(1) The above described cleaning agents will leave a conductive residue unless rinsed with generous amounts of water (usually not available in the field).

(2) Abrasive cleaners will destroy the surface gloss on the stick.

Note: All fiberglass tools that are subjected to such cleaning agents should be electrically tested under wetting conditions to ensure complete removal of residue from soap-type cleaners (see 5.3). Waxing is not necessary after every use of the tools but rather as needed to maintain a glossy surface that will cause any moisture or water to bead on the surface (see 5.5). Before the tool is rewaxed, to avoid a wax buildup, the pole should always be cleaned with a solvent or cleanser recommended by the manufacturer of the tools.

Waxing imparts not only a glossy finish to the surface of the fiberglass but also adds to the electrical integrity of the tool by providing a protective barrier against dirt, creosote, and other contaminants, and moisture.

OSHA Regulation

1910.269 Part J – Live Line Tools

(j)(2)(i)

Each live-line tool shall be wiped clean and visually inspected for defects before use each day.

(j)(2)(ii)

If any defect or contamination that could adversely affect the insulating qualities or mechanical integrity of the liveline tool is present after wiping, the tool shall be removed from service and examined and tested according to paragraph (j)(2)(iii) of this section for examination, cleaning, repair, and testing as follows:

(j)(2)(iii)(A)

Each tool shall be thoroughly examined for defects…1910.269(j) (2)(iii)(B)

(j)(2)(iii)(B)

If a defect or contamination that could adversely affect the insulating qualities or mechanical integrity of the live-line tool is found, the tool shall be repaired and refinished or shall be permanently removed from service. If no such defect or contamination is found, the tool shall be cleaned and waxed.

(j)(2)(iii)(C)

The tool shall be tested in accordance with paragraphs (j)(2)(iii)(D) and (j)(2)(iii)(E) of this section under the following conditions:

(j)(2)(iii)(C)(1)

After the tool has been repaired or refinished; and

(j)(2)(iii)(C)(2)

After the examination if repair or refinishing is not performed, unless the tool is made of FRP rod or foam-filled FRP tube and the employer can demonstrate that the tool has no defects that could cause it to fail in use.

American Polywater® Corporation

phone: 1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
email: support@polywater.com
11222 60th Street N, Stillwater, MN 55082, U.S.A

BE CLEAN! BE SAFE!

BOOM CLEANER

WAX

HOT STICK CLEANER

RUBBER GOODS CLEANER

GRIME-AWAY™ MULTI-PURPOSE CLEANER

BOOM CLEANER
B-1 ..... Prewash Wipe for Boom Maintenance
B-D72 .... 72-Count Boom Wipe Canister

WAX
W-1 ..... Fiberglass Wax & Buff Kit
W-16 ..... 16-Oz Fast-Hazing Fiberglass Wax

HOT STICK CLEANER
S-1 ..... Hot Stick Cleaner/Water Repellent Wipe

RUBBER GOODS CLEANER*
RBG-1 ..... Saturated Wipe
RBG-35LR .... Qt Spray Bottle
RBG-128 ..... 1-Gallon Jug
RBG-640 ..... 5-Gallon Pail
RBG-D72 ..... 72-Count Wipe Canister

GRIME-AWAY™ MULTI-PURPOSE CLEANER*
HTC-1 ..... Grime-Away™ Saturated Wipe
HTC-D72 ..... 72-Count Grime-Away™ Wipe Canister

* *Tested and approved for rubber goods use by SALISBURY by Honeywell*

American Polywater® Corporation
651-430-2270
www.polywater.com

Distributed by:

Rubber Goods Cleaner

American Polywater® Corporation

TECHNICAL DATA SHEET

Description:

Polywater® Rubber Goods Cleaner is a specially formulated water-based cleaner for removing grease, dirt, carbon, creosote, and other grimes from insulating blankets, lineman's gloves, rubber sleeves, jumper cables, hot jumpers, and line-hose. Polywater® Rubber Goods Cleaner is safe for use on all natural and synthetic rubbers.

Unlike other water-based rubber cleaners Polywater® Rubber Goods Cleaner contains no hazardous ingredients and is pH neutral, making it safe for use on skin. Polywater® Rubber Goods Cleaner is also completely biodegradable and safe for the environment.

Polywater® Rubber Goods Cleaner is ready to use and is available in multiple, convenient packages. It works well as a daily cleaner for field use.

Performance Properties:

Polywater® Rubber Goods Cleaner is safe on synthetic and natural rubber. It is also an effective cleaner. Polywater® Rubber Goods Cleaner removes difficult grimes with minimal soaking and wiping.

Used insulating rubber goods are obtained from a local utility. Samples are blackened with ground grime, typical of the industry. Polywater® Rubber Goods Cleaner is allowed to soak into the surface for 2 minutes. 90% of the grime is removed after 3 wipes.

Property	Result
Rubber Property-Effect of Liquids (ASTM D471)	Passes all tests
Specification for In-Service Care of Insulating Gloves and Sleeves (ASTM F496)	Passes all tests
Cleaning Strength	Excellent

Product Benefits:

- Great pre-wash prior to machine washing
- No mixing required
- Excellent cleaning power
- Harmless to all elastomers (rubbers)
- Multiple package options
- Environmentally friendly
- Non-toxic and non-corrosive
- Not an RCRA-regulated hazardous waste

End Use:

- Blankets
- Sleeves
- Line Hose
- Jumper Cables
- Grounds
- Lineman's Gloves

Approvals:

Approved by Salisbury (Honeywell Safety Products) for use with Salisbury Rubber Protective Parts.

Physical Properties:

Polywater® Rubber Goods Cleaner is a safe, water-based cleaner with excellent cleaning properties.

Property	Result
Flashpoint (ASTM D93)	No flash
Initial Boiling Point	~ 212°F (100°C)
pH	Neutral
Specific Gravity	< 1%
VOC Content	0 g/L

Compatibility:

Protective rubber gloves are exposed to Polywater® Rubber Goods Cleaner as described below, then washed and dried at the testing laboratory.[1] Gloves are inspected for defects. Items that fail visual inspection are rejected and immediately rendered unusable. Rubber goods additionally undergo an electrical test as specified by the "class rating" of the item and the ASTM and OSHA Standards (maximum 40kv A.C.). Again, any item that fails the electrical test is rejected.

Rubber Goods Exposed to Surface Wipe

Class	Type	Visual Check	Electrical Test (max 40kv A.C.)
00	1	PASS	PASS
00	2	PASS	PASS
0	2	PASS	PASS
1	1	PASS	PASS
2	1	PASS	PASS

Rubber Goods Exposed to 5-minute Soak

Class	Type	Visual Check	Electrical Test (max 40kv A.C.)
0	2	PASS	PASS
1	1	PASS	PASS

Rubber Goods Exposed to 24-hour Soak

Class	Type	Visual Check	Electrical Test (max 40kv A.C.)
00	1	PASS	PASS
00	2	PASS	PASS
0	2	PASS	PASS
1	1	PASS	PASS
2	1	PASS	PASS

[1] Tested by an independent NAIL® for PET (North American Independent Laboratories for Protective Equipment Testing) accredited laboratory in accordance with ASTM F496, "Standard Specification for In-Service Care of Insulating Gloves and Sleeves."

Soak Testing:

Polywater® Rubber Goods Cleaner is compatible with plastics and elastomers. Immersion will affect sensitive materials more than incidental contact of a spray and wipe.

Immersed 72 Hours at 122°F (50°C)

Elastomers	% Weight Change	Appearance
EPDM	NC	NC
EPDM (Type II) blanket, line hose	NC	NC
EPDM gloves	NC	NC
Natural Rubber	NC	NC
Natural Rubber (Type I) blanket	NC	NC
Natural Rubber (Type I) gloves	NC	NC
SALCOR® (Type II) blanket	NC	NC
Silicone	NC	NC

Immersed 28 Days at 70°F (21°C)

Elastomers	% Weight Change	Appearance
EPDM	NC	NC
EPDM (Type II) blanket, line hose	NC	NC
EPDM gloves	NC	NC
Natural Rubber	NC	NC
Natural Rubber (Type I) blanket	NC	NC
Natural Rubber (Type I) gloves	NC	NC
SALCOR® (Type II) blanket	NC	NC
Silicone	NC	NC

KEY:

NC = No Change
S = Swelling
ES = Extreme Softening
C = Crazing
SS = Slight Swelling
D = Dissolved

Testing based on ASTM D471, "Standard Test Method for Rubber Property Effect of Liquids."

Usage Directions:

Apply Polywater® Rubber Goods Cleaner by spraying, dipping, brushing, or wiping. Evenly coat rubber surface with cleaner. If using Polywater® Rubber Goods Wipe (RBG-1 or RBG-D72), open towel and use soft side to wipe down and fully wet surface of material.

Leave Polywater® Rubber Goods Cleaner on the surface of the material to be cleaned for 2 minutes or more to loosen and dissolve deposits. Allow cleaner to soak material longer for more difficult grimes. The longer Polywater® Rubber Goods Cleaner is on the surface the more it penetrates and breaks loose the creosote, dirt, grease, oils and other grimes without harming the rubber surface.

Once material has soaked, wipe surface clean with a rag or towel. A minimal amount of scrubbing may be required.

Rinse material with water and either dry with a clean cloth or air dry before use. Use Polywater® Rubber Goods Cleaner daily to clean the rubber's surface for visual inspections to uncover burns, cuts, nicks, crush points, and abrasions on equipment and gloves.

For best results leave RBG cleaner on rubber goods for at least 2 minutes before wiping or scrubbing down surface.

To see a demonstration video of Rubber Goods Cleaner go to www.polywater.com/videos.asp

Safety:

Polywater® Rubber Goods Cleaner has a low level of toxicity and is environmentally friendly. Good industrial hygiene practice and appropriate precautions should be employed during use. See SDS for specific details.

Safe LIVE LINE Equipment Practices:

Proper protection and performance of rubber protective equipment requires a detailed visual inspection before each use. Visual inspection of rubber goods should be performed before each use in accordance with ASTM F1236 "Standard Guide for Visual Inspection of Electrical Protective Rubber Products". Rubber protective equipment should be checked for:

- Abrasions, cuts, crush points, gouges, holes, punctures, and tears
- Embedded foreign objects
- Ozone cutting or ozone checking
- Swelling, softening, hardening, stickiness, and inelasticity
- Any other defect that damages the rubber insulating properties of the protective equipment

Cleaning of rubber protective equipment is necessary not only for visual inspections but to preserve the protective equipment. Creosote, dirt, grease, and other contaminants can be conductive, especially when combined with moisture from rain, snow, and fog. Protective equipment should be cleaned daily and whenever contaminated during use. **Strong industrial cleaners and solvents may cause permanent damage to the rubber protective equipment.** These products may cause rubbers to swell, soften, and lose electrical insulating properties.

Polywater® Rubber Goods Cleaner is safe to use on all rubber products, including: covers, line-hose, gloves, sleeves, and insulating blankets. Daily use of Polywater® Rubber Goods Cleaner makes inspection of protective equipment easier and helps to maintain the electrical insulating properties of the equipment.

Model Specification:

The statement below may be inserted into a customer specification to help maintain engineering standards and ensure work integrity.

The rubber goods cleaner shall be a pH neutral, water-based solution that effectively cleans all types of grimes from insulating rubber goods. The cleaner shall remove a wide variety of contaminants such as hydrocarbon grease, carbon grime, creosote, tree sap, fertilizer residue, soils and dirt.

The rubber goods cleaner shall be safe for use on all types of rubber goods, insulating blankets, lineman's gloves, rubber sleeves, jumper cables, and line hose. EPDM rubber, silicone rubber, and natural rubber shall not be affected when immersed in the rubber goods cleaner and tested according to ASTM D471, Standard Test Method for Rubber Property-Effect of Liquids. Rubber goods exposed to a 24-hour soak shall pass high voltage testing in accordance with ASTM F496, Standard Specification for In-Service Care of Insulating Gloves and Sleeves. **Standard testing must be completed by an independent, NAIL® for PET (North American Independent Laboratories for Protective Equipment Testing) accredited laboratory to verify testing compliance.**

The rubber goods cleaner shall not require dilution, shall be pH neutral, and shall not have a flashpoint. The rubber goods cleaner shall be available in a number of packaging options, including presaturated towels and spray trigger bottles.

Order Information:

Type RBG™ Rubber Goods Cleaner is available in multiple package options.

Cat #	Package Description
RBG-1	Individual saturated wipe (144/cs)
RBG-D72	72-count saturated wipe dispenser (6/cs)
RBG-35LR	1-quart bottle with sprayer (12/cs)
RBG-128	1-gallon bottle (4/cs)
RBG-640	5-gallon pail (1 ea)

Important Notice: The statements here are made in good faith based on tests and observations we believe to be reliable. However, the completeness and accuracy of the information is not guaranteed. Before using, the industrial end-user should conduct whatever evaluations are necessary to determine that the product is suitable for the intended use.

American Polywater expressly disclaims any implied warranties and conditions of merchantability and fitness for a particular purpose. American Polywater's only obligation shall be to replace such quantity of the product proven to be defective. Except for the replacement remedy, American Polywater shall not be liable for any loss, injury, or direct, indirect, or consequential damages resulting from product's use, regardless of the legal theory asserted.

Lit-RBGTECHSPEC2011/REV000

Makers of Boom™ Cleaner, Live-Line Tool Cleaning and Wax Wipes (W-1) and Hot Stick Cleaner and Wax Repellent Wipes (S-1)

Polywater®
11222 60th St.N
Stillwater, MN 55082
U.S.A
1-800-328-9384
1-651-430-2270
http://www.polywater.com (URL) support@polywater.com (e-mail)

Honeywell

SALISBURY
by Honeywell

Honeywell Safety Products
101 East Crossroads Parkway
Suite A
Bolingbrook, IL 60440

Toll Free: 877-406-4501
Telephone: 630-343-3700
Fax: 630-343-3838

Date: 4/18/2011

To: Joe Climaco

From: John Terzic

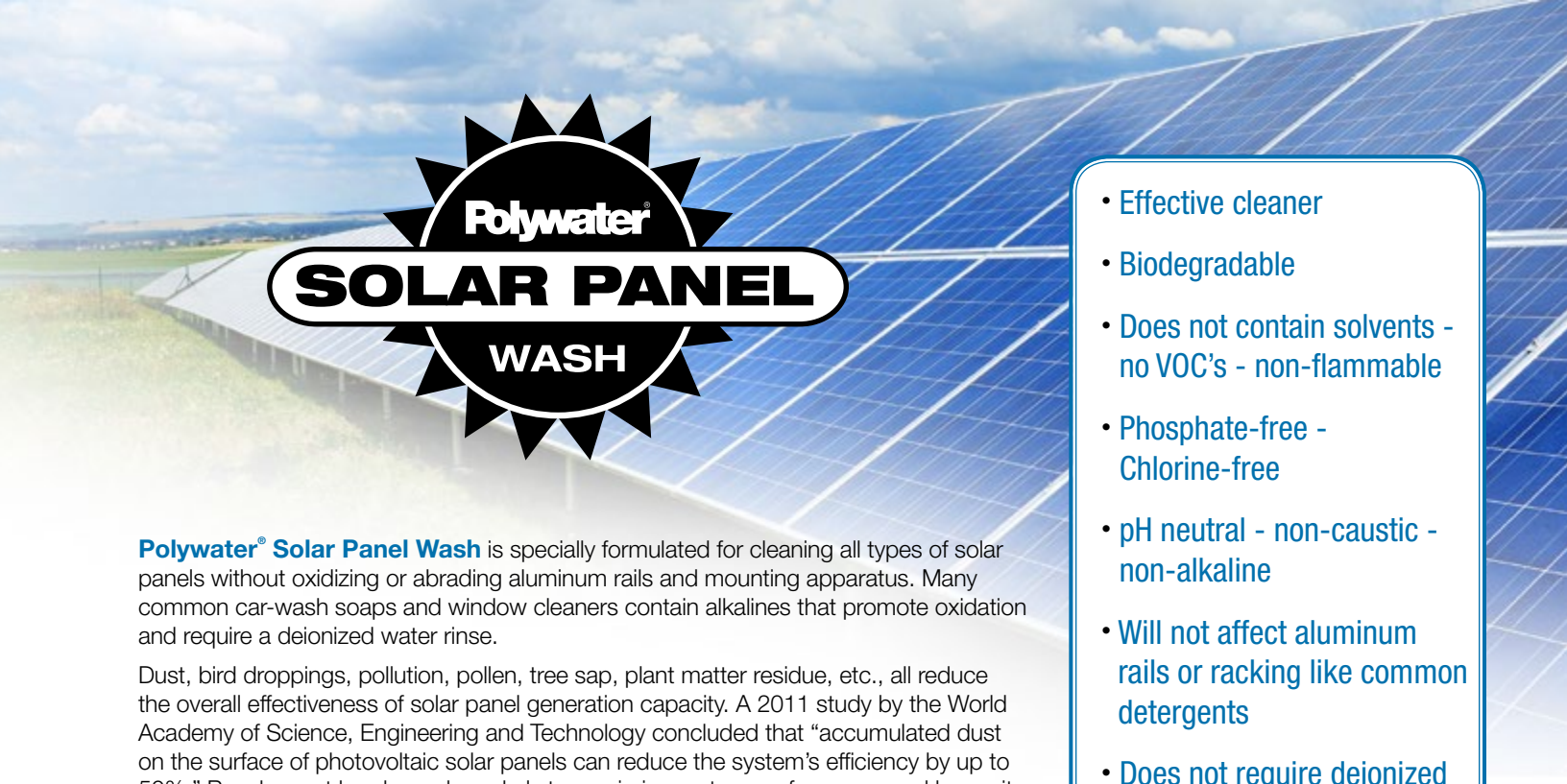
Re: Rubber Goods Cleaner

A sample of Rubber Goods Cleaner, Catalog #RBG-35LR, from Polywater Corporation, along with the MSDS and Technical Bulletin, were received to determine if this product can safely be used in field cleaning of our rubber protective products such as blankets and sleeves.

In reviewing both the Technical Bulletin and MSDS, this product appears safe for this application. To confirm it, we took natural rubber yellow sleeve, an EPDM orange blanket, and a yellow EPDM blanket. The three products were well rubbed with the cleaning solution and allowed to sit overnight with the top side covered with the solution. After 24 hours the three parts were rinsed and carefully examined. We found no discoloration or any other deformities. The three parts were also tested for physical properties before and after the test. Tensiles, elongation, and the hardness remained the same after the test.

In view of these findings, this product is safe for the cleaning of Salisbury rubber protective parts. The soap must immediately be rinsed out with water after the application.

All safety instructions given in the MSDS for this product must be observed. Also the application instructions on the product label must be observed.



Polywater® SOLAR PANEL WASH

- Effective cleaner
- Biodegradable
- Does not contain solvents - no VOC's - non-flammable
- Phosphate-free - Chlorine-free
- pH neutral - non-caustic - non-alkaline
- Will not affect aluminum rails or racking like common detergents
- Does not require deionized or purified water rinse

Polywater® Solar Panel Wash is specially formulated for cleaning all types of solar panels without oxidizing or abrading aluminum rails and mounting apparatus. Many common car-wash soaps and window cleaners contain alkalines that promote oxidation and require a deionized water rinse.

Dust, bird droppings, pollution, pollen, tree sap, plant matter residue, etc., all reduce the overall effectiveness of solar panel generation capacity. A 2011 study by the World Academy of Science, Engineering and Technology concluded that "accumulated dust on the surface of photovoltaic solar panels can reduce the system's efficiency by up to 50%." Panels must be cleaned regularly to maximize system performance and longevity.

Even if only one panel in a string operates at 10% less than full capacity due to contamination, the entire string suffers the same 10% performance loss. This is known in the industry as the "Christmas-lights effect". The small cost of regular cleaning with Polywater® Solar Panel Wash yields big savings by increasing panel capacity.

Usage

For best results product should be diluted.

- For pressure washers, hose sprayers, etc., dilute 1:25
- For persistent soils, use a higher concentration of Solar Panel Wash and a soft cloth or brush to remove any remaining residues. Rinse the panels with 1:25 SPW™ solution and allow to dry. SPW™ leaves a clean surface that will dry faster, reduce spotting, and repel soil, making it easier to clean your panels the next time. As an option, rinse surface with water. Observe the condition of the panels and repeat the process above if necessary.
- For SPW™ application tips please go to our support page link.

Package Size	Polywater® Solar Panel Wash Product#	Units/Case
1-quart bottle with hose sprayer attachment (.95 liters)	SPW-35HS	12
1-gallon pail (3.8 liters)	SPW-128	4
5-gallon pail (18.9 liters)	SPW-640	1

SPW™ being used to clean panels.

Clean panels after using SPW™.

To view technical information on our website go to:
Support Page: www.polywater.com/solarpanelwash.html
Application Videos: www.polywater.com/videos.asp

American Polywater® Corporation

phone: 1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
email: support@polywater.com
11222 60th. St. N., Stillwater, MN 55082, U.S.A

ADHESIVES | **CLEANERS** | LUBRICANTS | SEALANTS WWW.POLYWATER.COM

LIT-SPWFLYER/REV003

American Polywater® Corporation

11222 60th Street North Stillwater,
Minnesota 55082 U.S.A.

Telephone: 1-651-430-2270
1-800-328-9384
Fax: 1-651-430-3634

www.polywater.com
support@polywater.com

General Maintenance Note:
Inspect the entire solar array system prior to cleaning to detect loose or broken wires, panels, or improperly functioning apparatus. Make necessary repairs before cleaning. Take before-and-after photos and system output readings for presentation to the customer. Schedule quarterly cleaning and maintenance with the customer to keep their system operating at its theoretical maximum output.

Solar Panel Wash SPW™ Usage Recommendation:
Recommended dilution ratio is 1 part Solar Panel Wash SPW™ to 25 parts water (25-1). For heavily soiled areas, use either a higher SPW™ cleaner concentration or more rinsing. The cat #SPW-35HS hose adapter package has a selector switch atop the sprayer to toggle between the 25-1 and water-only ratios.

1) Use 25-1 Solar Panel Wash solution to rinse panels. Rinsing is done first to remove loose sand and debris from the panels, which helps prevent scratching when using brushes. In locales known for hard water, use deionized water to dilute the SPW™. It is okay to rinse with water only.

2) Allow the dirt to drain from the surface and spray the panels with Polywater® Solar Panel Wash SPW™ diluted 25-1 again. Wet only the number of panels that can be brushed and rinsed before the SPW™ solution dries. Large arrays may need to be cleaned section by section. Use heavier amounts of SPW™ on bird dropping areas.

3) Scrub panels with a very soft brush. Rinse the brush bristles frequently when cleaning heavily soiled systems to reduce scratching. Using brushes also helps agitate the SPW™; dirt tends to "carry" or lift off the panels better. Water alone--even deionized water--will not lift or carry off dirt adequately. SPW™ is far more effective at removing residue and cleaning panels.

4) Rinse the panels with 25-1 SPW™ solution and allow to dry if you are looking to leave an anti-static finish, otherwise use deionized water or a water rinse. Observe the condition of the panels and repeat the process above if necessary.

5) If desired, buff the dry, clean panels with blue microfiber cloths followed by white microfiber cloths for a fine finish.

SUNSHINE SOLUTIONS
Efficiency Matters

January 26, 2015

My company, Sunshine Solutions, specializes in cleaning and maintaining solar panels for residential, commercial and solar farm operations.

We pride ourselves on the way we clean solar panels. Just using deionized water alone will not effectively clean panels and won't make the job any easier the next time a scheduled cleaning is needed because you're not using any cleaner along with it to help remove dirt, soil, airline fuel residue and bird droppings. If you don't remove the dirt from panels it will scratch them so much that eventually it reduces their output.

Recently we used a product from American Polywater Corporation called "Solar Panel Wash" for two weeks on a variety of jobs, including a very tough one on a 314-panel solar array at a car dealership. This product was superior to the product we were using because we used less of it to clean the same number of panels, it didn't dry out as quickly on the panels as the other products, and it didn't leave a film.

Our cleaning operation differentiates itself from "window washing" companies because we carry insurance to be on roofs, can identify and fix operational problems in the solar system, utilize specialty brushes and micro fiber towels to buff the panels clean, and use Polywater's Solar Panel Wash, which is biodegradable and compatible with the solar panels' parts.

Our company plans to use Polywater's Solar Panel Wash on all of our projects to help make the job of cleaning easier the next time we are there to service them. By using their product and cleaning panels on a regular basis, your system will produce more output and last longer than others. Many owners don't realize the damage that can occur when they fail to clean their panels.

Sincerely,

JR
Sunshine Solutions
http://www.socalsunshinesolutions.com/

3283 Trade Center Drive Riverside, Ca 92507 951-787-9803

SOLARWORLD AMERICAS INC.
25300 NW Evergreen Rd.
Hillsboro, OR 97124
U.S.A.
Telephone: 800-947-6527
Fax: 503-844-3403
customerservice@solarworld.com
Website: solarworld.com

September 23, 2015

To whom it may concern,

American Polywater Corporation's Polywater® Solar Panel Wash SPW™ has been tested with SolarWorld photovoltaic solar modules under the accelerated test procedure outlined below.

Test Duration:

May 1 to May 14, 2015

Test Set-Up

Two new SolarWorld panels were provided to American Polywater and installed at a 45-degree angle on a south facing well at their factory location in Stillwater, MN.

To simulate precipitation and soiling the modules were sprayed for 15 minutes daily at 3 am with standard ground water. The ground water conductivity was measured at 95 µS and a water hardness of 67 parts per million (ppm).

Test Methodology

1. Monday: Between 8 and 10 am each panel was rinsed with a 25:1 solution of Solar Panel Wash SPW and water. The panels were then scrubbed with a soft nylon bristle brush and then rinsed with the same 25:1 solution of Solar Panel Wash SPW and allowed to air dry without any additional rinse.
2. Tuesday – Friday: Between 8 and 10 am each day the panels were rinsed with the 25:1 solution of SPW and allowed to air dry.
3. Saturday – Sunday: The panels were not cleaned over the weekends but were sprayed for 15 minutes at 3 am each day.
4. This process was run for a total of two weeks from May 1 to May 14

Results

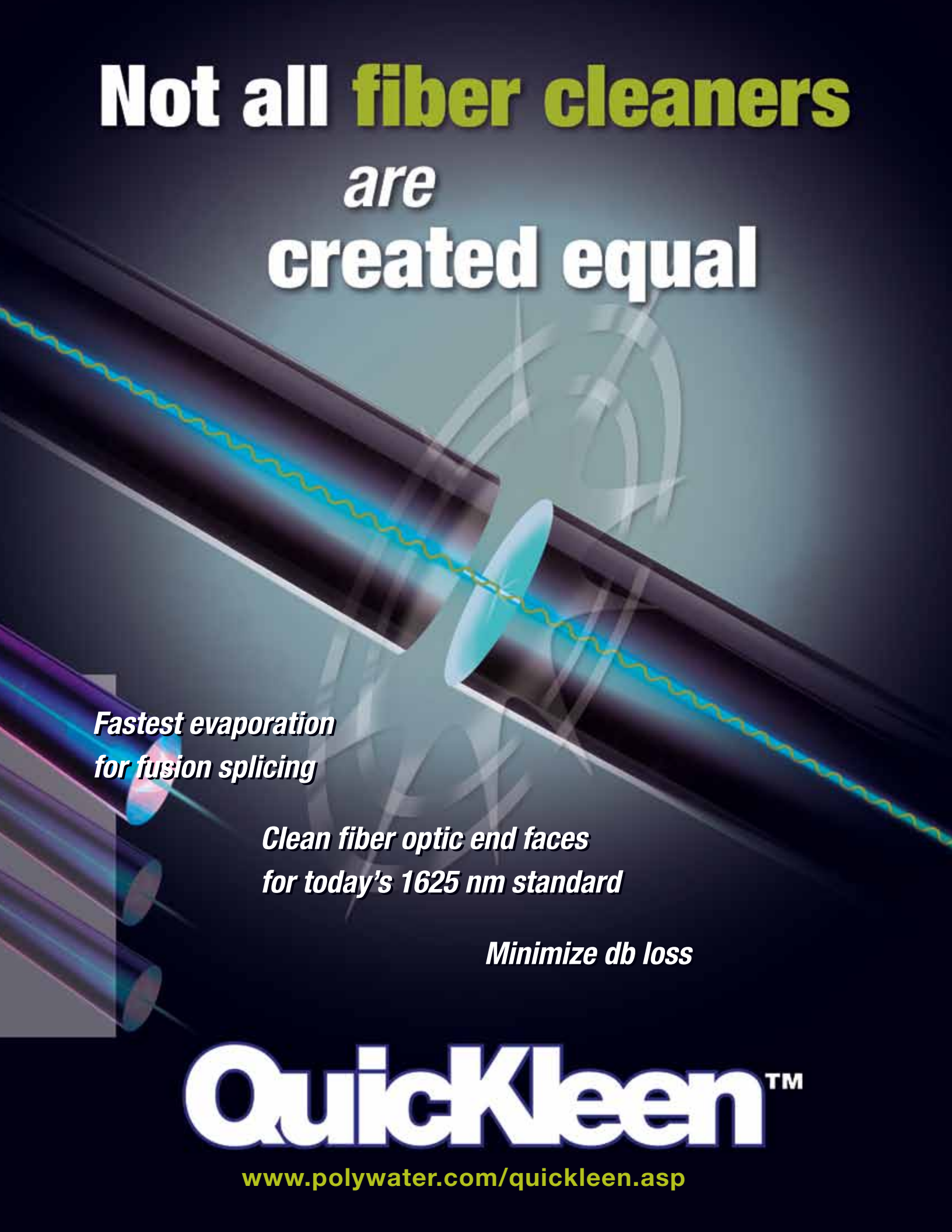
The modules were returned to SolarWorld Americas and retested; their post-test performance was compared to their original manufactured performance. Polywater® Solar Panel Wash SPW™ did not have any appreciable effect on the module performance, antireflective glass coating or frame anodized coating.

Conclusion

When used as directed by American Polywater their Solar Panel Wash SPW™ is not an exclusion to the standard SolarWorld warranty. Care must be taken when cleaning solar panels. When cleaning solar modules with water or Solar Panel Wash SPW™ a soft bristle brush must be used and the modules should only be cleaned when they are cool; failure to do so may damage the module. Furthermore SolarWorld's performance and limited product warranty are never void but we do retain the right to deny claims based on the exclusions within the guarantee and limited product warranty document at the time of purchase.

Sincerely,

Eric Olson
Product Manager – Modules
SolarWorld Americas, Inc.


Not all fiber cleaners
are
created equal
Fastest evaporation
for fusion splicing
Clean fiber optic end faces
for today's 1625 nm standard
Minimize db loss
QuickKleen™
www.polywater.com/quickleen.asp

Fastest Evaporation Rate! Great for fusion splicing! Unique solvent blend cleans completely, leaves no residue, and evaporates quickly. Products available individually, or as a kit.

CATALOG #	DESCRIPTION	CASE QUANTITY
QC-2LP	2-Oz QuicKleen™ Type QC™ Finger Sprayer	12
QC-KIT2	QuicKleen™ Type QC™ Kit 2 QC-2LP 1 DT-D175 1 SWB-250F100	1

CASE CATALOG #	DESCRIPTION	CASE QUANTITY
DT-D175	175-Count Microfiber FiberKleen™ Dry Towel Plastic Dispenser Pack	12
SWB-250F100	2.5 mm FiberKleen™ Foam Swab 100-Pack	5
SWB-125F10	1.25 mm FiberKleen™ Foam Swab 10-Pack	5
SWB-C100	FiberKleen™ Cotton Swab 100-Pack	5
SWB-V100	V Groove FiberKleen™ Foam Swab 100-Pack	5
SWB-M100	Mirror FiberKleen™ Foam Swab 100-Pack	5

FiberKleen™ towelette dispenser contains 175 lint-free, microfiber towels that are used to clean ferrules, bulkheads and fiber end-faces. Keeps towels safe from contamination and easily fits into tool kits and bags.

The engineered design of the specially non-woven, highly absorbent microfiber towel traps the dirt and debris removed from ferrules, making cleaning easier and more effective. Variety of swabs also available.

All products non-hazardous for air shipment.

LIT-QCFLYER/REV002

American Polywater® Corporation
11222 60th St. N.
Stillwater, MN 55082
U.S.A.

1-800-328-9384
1-651-430-2270
fax 1-651-430-3634
support@polywater.com (e-mail)

QuicKleen™
Performance Fiber Cleaner

American Polywater® Corporation

TECHNICAL DATA SHEET

Description:

QuicKleen™ Fiber Cleaner is formulated for fast cleaning of high speed fiber and specialty optics. It quickly penetrates precision parts to lift drywall dust, buffer gel, lint, finger prints, and oils. The excellent cleaning capabilities of QuicKleen™ minimize dB losses to maximize optical network performance.

QuicKleen™ Fiber Cleaner evaporates quickly without residue. The fast-drying character means solvent is not trapped in the connector to reduce signal loss. QuicKleen™ dissipates static and removes surface charge so that the surface is less likely to be re-contaminated. QuicKleen™ is non-flammable and safe to use.

QuicKleen™ Fiber Cleaner is packaged in an easy to use pump sprayer that allows precise cleaner application which limits waste and contamination. Polywater's non-woven FiberKleen™ towelettes trap dirt and absorb contaminants from high speed fiber and optical equipment. A smooth wiping surface and durable material promote easy, effective cleaning.

Performance Properties:

QuicKleen™ Fiber Cleaner is a high performance optical cleaner. QuicKleen™ removes a broad variety of endface contaminants.

Soil Type	Cleaning Effectiveness
Dry/Ionic Soil (dust, salt)	Excellent
Wet/Non-Ionic Soil (oil, buffer gel)	Excellent
Combination Soil	Excellent

QuicKleen™ Fiber Cleaner has been tested to the rigorous standards of Telcordia GR 2923-CORE, "Generic Requirements for Fiber Optic Connector Cleaning Products."

Product Benefits:

- Evaporates Quickly
- Maximizes Connectivity
- No Residue
- No Streaking
- Dissipates Static
- Non-Flammable
- Easy to Transport

End Use:

QuicKleen™ Fiber Cleaner is an excellent choice for cleaning precision fiber-optic components such as:

- Endfaces
- Single-mode Fiber
- Multi-mode Fiber
- Ferrules
- Bulkheads
- Lenses, Mirrors

Approvals:

- Meets Telcordia GR 2923-CORE, "Generic Requirements for Fiber Optic Connector Cleaning Products."
- RoHS and WEEE compliant

Physical Properties:

QuicKleen™ Fiber Cleaner is a high purity, optical grade cleaner.

Property	Result
Residue	< 100 ppm
Flashpoint (ASTM D93)	None
Initial Boiling Point	131°F (55°C)
Specific Gravity	1.48
Evaporation Rate	Fast

Environmental Impact:

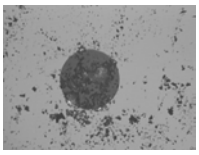
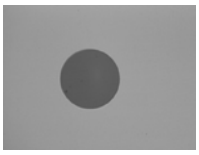
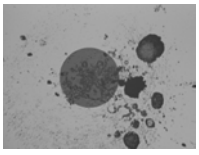
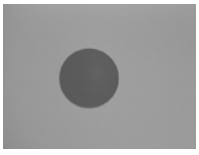
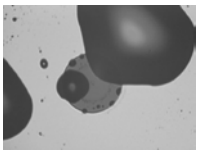
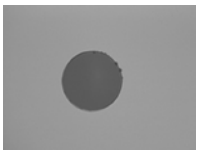
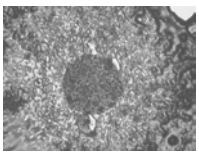
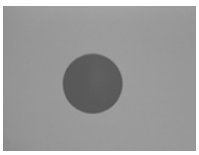
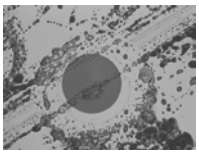
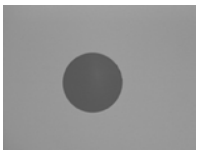
Property	Result
VOC Content	67 g/L
Global Warming Potential	310
Ozone Depletion Potential	0
CFC, HCFC Content:	None
RCRA	Not regulated as hazardous waste
CERCLA/SARA Status	Not regulated as a hazardous substance
RoHS and WEEE	Compliant
REACH	Compliant

Safety:

QuicKleen™ Fiber Cleaner has minimal toxicity and does not contain any listed carcinogens. Good industrial hygiene practice and appropriate precautions should be employed during use. See SDS for specific details.

Cleaning Properties:

QuicKleen™ Fiber Cleaner removes a broad range of contaminants from fiber connectors. To prove this, reference reflectance and transmitted power is measured on an unsoiled test connector at 1310 nm, 1550 nm and 1625 nm. Then the near-end connector plug is removed and soiled according to standard[1]. Connector end adapter is cleaned using recommended procedure. Insertion loss and reflectance are measured and compared to control. An electronic image of each cleaning is recorded.

Soil	Image – Soiled	Image – 1st Cleaning
Gypsum		
Carbon Black		
Olive Oil		
Gypsum/ Buffer Gel		
Gypsum/ 10W30 Oil		

Soil	Insertion Loss	Reflectance
Gypsum	Pass (<0.05 dB loss)	Pass (<2 dB change)
Carbon Black	Pass (<0.05 dB loss)	Pass (<2 dB change)
Olive Oil	Pass (<0.05 dB loss)	Pass (<2 dB change)
Gypsum/Buffer Gel	Pass (<0.05 dB loss)	Pass (<2 dB change)
Gypsum/10W30 Oil	Pass (<0.05 dB loss)	Pass (<2 dB change)

[1] *Tested using methods from Telcordia GR-2923-CORE, "Generic Requirements for Fiber Optic Connector Cleaning Products."*

Compatibility:

QuicKleen™ Fiber Cleaner is compatible with most common plastics and rubbers.

Polycarbonate:
Injection-molded plaques of polycarbonate are cut into bars, 2½ inch by ½ inch. Samples are bent in a three-point fixture. Percent strain is calculated based on the bar thickness and the radius of curvature.

"Strain limit" is the greatest percent strain where no stress cracking occurs. A strain limit greater than 0.5% indicates strain resistance.

Strain Limit > 0.5%

QuicKleen™ Fiber Cleaner shows good compatibility with polycarbonate.

Cladding:
Fiber cladding (Corning Cable) is firmly wiped 5 times with a cleaner-saturated towel. Towel and cable are visually inspected for cladding transfer or damage.

Cladding shows no visible damage.

QuicKleen™ Fiber Cleaner shows good compatibility with fiber cladding.

Soak Testing:
Materials are immersed in QuicKleen™ Fiber Cleaner for an hour at 50°C (122°F). Rubbers may swell slightly, but will return to their original state once the cleaner evaporates.

Plastic	Compatibility
Nylon 66	Excellent
Polycarbonate	Excellent
Polyethylene (HDPE)	Excellent
Polyethylene (LDPE)	Excellent
PVC	Excellent

Rubber	Compatibility
Silicone Rubber	Excellent
EPDM	Excellent

Usage Directions:

QuicKleen™ Fiber Cleaner is best used with the combination wet - dry cleaning procedure recommended in Telcordia GR-2923-CORE. Microfiber towels (DT-D175) available from American Polywater Corporation work well with this method.

A light spray of cleaner is placed on the towel. Preferred cleaning motion is a straight line motion, drawing the endface through the wetted portion of the towel, and then through a clean portion of a second dry towel. Swabs may be dampened on the wetted portion of the towel in order to clean the alignment adaptor or scope.

Application Properties:

Temperature Use Range:
20°F to 120°F (-5°C to 50°C)

Storage and Shelf Life:
Keep containers tightly closed when not in use. Shelf life is 2 years.

Packaging:

QuicKleen™ Fiber Cleaner is packaged in a safety sealed container that resists spills, leaks and contamination. The 2-fluid ounce spray bottle has over 500 uses.

Microfiber Towels:
FiberKleen™ Dry Towels offer high absorbency and are made from non-linting, non-fraying ultra-clean material. This specialty, microfiber fabric is engineered for optimum particle entrapment. The durable towel has a smooth surface for easy cleaning. It meets Telcordia Specification.

Convenient Kit Packaging and Cleaning Accessories

Model Specification:

The statement below may be inserted into a customer specification to help maintain engineering standards and ensure work integrity.

The fiber cleaner shall be effective on both ionic and non-ionic soils. It shall meet the cleaning criteria of Telcordia GR 2923-CORE, "Generic Requirements for Fiber Optic Connector Cleaning Products." It shall contain an oxygenated solvent component for static dissipation.

The cleaner shall be fast evaporating and non-flammable. It shall leave minimal residue of less than 100 ppm. The cleaner shall be compatible with fiber optic components. It shall not stress crack polycarbonate and shall have a strain limit greater than 0.5%.

The cleaner shall not contain an aerosol propellant. It shall be packaged in a plastic bottle that allows cleaner to be dispensed in a fine mist spray pattern.

Order Information:

Cat #	Package Description
QC-2LP	2-oz QuicKleen™ Fiber Cleaner Finger Sprayer
QC-KIT2	QuicKleen™ Fiber Cleaner Kit: 2 QC-2LP 3 DT-D50 1 SWB-250100
SWB-250100	2.5 mm FiberKleen™ foam swab (100 pack)
SWB-125F10	1.25 mm FiberKleen™ foam swab (10 pack)
SWB-C100	FiberKleen™ cotton swab (100 pack)
SWB-V100	V Groove FiberKleen™ foam swab (100 pack)
SWB-M100	Mirror FiberKleen™ foam swab (100 pack)
DT-D50	50 non-linting towels in a sealed pocket case
DT-D175	125 microfiber towels, in a sealed case with cleaning pad

Lit-QCTECHSPEC/REV003

Makers of Polywater® and Dyna-Blue® Cable Lubricants and Pull-Planner™ Software

American Polywater® Corporation

11222 60th St. N
Stillwater, MN 55082
U.S.A
1-800-328-9384
1-651-430-2270
http://www.polywater.com(URL) support@polywater.com(e-mail)


Who says you can't clean
fiber with water?
• Water-based
• Less toxic
• Eco-friendly
AquaKleen™
polywater.com/aquakleen.asp

Who says you can't clean fiber with water? Defying conventional wisdom, AquaKleen™ Water-based Fiber Optic Endface Cleaner is a brand new solution to the problem of cleaning fiber.

A special blend of 94% pure deionized water, with cleaning solvents, AquaKleen™ Cleaner is friendly to the environment, less toxic, and safer for use by humans.

Products available individually, or as a kit:

CATALOG #	DESCRIPTION	CASE QUANTITY
AQ-2LP	2-Oz AquaKleen™ Type AQ Finger Sprayer	12
AQ-WETDRY1	AquaKleen™ Wet/Dry Wipe Tandem Pack	144
AQ-2DR	2-OZ AquaKleen™ Squeeze Bottle	12
AQ-KIT2	AQ-KIT2 AquaKleen™ Type AQ Kit Kit contains: 2 X AQ-2LP 1 X DT-D175 1 X SWB-250F100	1
AQ-KIT3	AQ-KIT3 AquaKleen™ Type AQ Kit Kit contains: 2 X AQ-2DR 1 X DT-D175 1 X SWB-250100	1

CASE CATALOG #	DESCRIPTION	CASE QUANTITY
DT-D175	175-Count Microfiber FiberKleen™ Dry Towel Plastic Dispenser Pack	12
SWB-250F100	2.5 mm FiberKleen™ Foam Swab 100-Pack	5
SWB-125F10	1.25 mm FiberKleen™ Foam Swab 10-Pack	5
SWB-C100	FiberKleen™ Cotton Swab 100-Pack	5
SWB-V100	V Groove FiberKleen™ Foam Swab 100-Pack	5
SWB-M100	Mirror FiberKleen™ Foam Swab 100-Pack	5

FiberKleen™ towelette dispenser contains 175 lint-free, high quality microfiber towels that are used to clean ferrules, bulkheads and fiber endfaces. The engineered design of the nonwoven, highly absorbent towel traps the dirt and debris removed from ferrules, making cleaning easier and more effective. Variety of swabs also available.

Meets Telcordia specification GR-2923-CORE, "Generic Requirements for Fiber Optic Connector Cleaning Products."

All products non-hazardous for air shipment.

American Polywater® Corporation

1-800-328-9384
1-651-430-2270
fax 1-651-430-3634
support@polywater.com (e-mail)

polywater.com/aquakleen.asp

LIT-AQFLYER/REV001

AquaKleen™
Water-based Fiber Cleaner

American Polywater® Corporation

TECHNICAL DATA SHEET

Description:

AquaKleen™ Fiber Cleaner is formulated for cleaning fiber-optic cables and endfaces. Its excellent wetting reaches precision parts to lift dust, buffer gel, lint, finger prints, and oils. AquaKleen™ dissipates static to remove surface charges so that the surface is less likely to be re-contaminated.

AquaKleen™ Fiber Cleaner contains innovative, water-based technology. A special blend of 94% ultra-pure deionized water with proprietary solvents; it does not leave a residue. AquaKleen™ is an environmentally desirable cleaner. It does not contribute to global warming or ozone depletion and has very low VOC content. AquaKleen™ is non-flammable and has low toxicity for safe use.

AquaKleen™ Fiber Cleaner is packaged in easy-to-use containers that allow precise cleaner application, reduce waste, and limit contamination. Polywater's non-woven FiberKleen™ towelettes trap dirt and absorb contaminants from high-speed fiber and optical equipment. A smooth wiping surface and durable material promote easy, effective cleaning.

Performance Properties:

AquaKleen™ Fiber Cleaner is a high-performance optical cleaner. AquaKleen™ removes a broad variety of endface contaminants.

Soil Type	Cleaning Effectiveness
Dry/Ionic Soil (dust, salt)	Excellent
Wet/Non-Ionic Soil (oil, buffer gel)	Excellent
Combination Soil	Excellent

AquaKleen™ Fiber Cleaner has been tested to the rigorous standards of Telcordia GR 2923-CORE, "Generic Requirements for Fiber Optic Connector Cleaning Products."

Product Benefits:

- Eco Friendly, Non-Toxic
- Water-based
- Dissipates Static
- No Residue
- Excellent Solvency
- Non-Flammable
- Easy to Transport

End Use:

AquaKleen™ Fiber Cleaner is an excellent choice for cleaning precision fiber-optic components such as:

- Endfaces
- Single-mode Fiber
- Multi-mode Fiber
- Ferrules
- Bulkheads
- Lenses, Mirrors

Approvals:

- Meets Telcordia GR 2923-CORE, "Generic Requirements for Fiber Optic Connector Cleaning Products."
- RoHS and WEEE compliant.

Physical Properties:

AquaKleen™ Fiber Cleaner is a high purity, optical grade cleaner.

Property	Result
Residue	< 100 ppm
Flashpoint (ASTM D93)	>140°F (60°C)
Initial Boiling Point	212°F (100°C)
Specific Gravity	1.0
Evaporation Rate	Medium

Environmental Impact:

AquaKleen™ Fiber Cleaner is an excellent alternative to solvent-based cleaners.

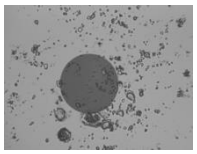
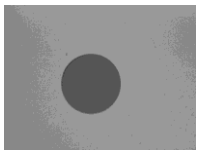
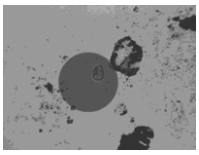
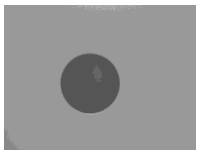
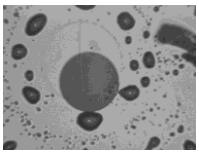
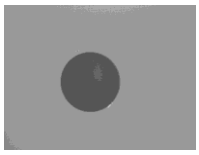
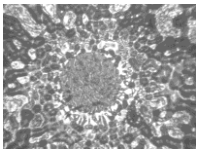
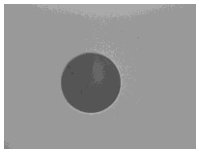
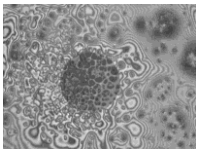
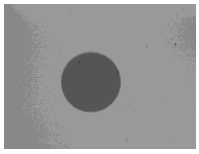
Property	Result
VOC Content	60 grams/liter
Global Warming Potential	Does not contain global warming compounds
Ozone Depletion Potential	None
CFC, HCFC, HFC Content:	None
RCRA	Not regulated as hazardous waste
CERCLA/SARA Status	Not regulated as a hazardous substance
RoHS and WEEE	Compliant
REACH	Compliant

Safety:

AquaKleen™ Fiber Cleaner has a low level of toxicity and does not contain any listed carcinogens. Good industrial hygiene practice and appropriate precautions should be employed during use. See MSDS for specific details.

Cleaning Properties:

AquaKleen™ Fiber Cleaner removes a broad range of contaminants from fiber connectors. To prove this, reference reflectance and transmitted power is measured on an unsoiled test connector at 1310 nm, 1550 nm and 1625 nm. Then the near-end connector plug is removed and soiled according to standard[1]. Connector end adapter is cleaned using recommended procedure. Insertion loss and reflectance are measured and compared to control. An electronic image of each cleaning is recorded.

Soil	Image – Soiled	Image – 1st Cleaning
Gypsum		
Carbon Black		
Olive Oil		
Gypsum/ Buffer Gel		
Gypsum/ 10W30 Oil		

Soil	Insertion Loss	Reflectance
Gypsum	Pass (<0.05 dB loss)	Pass (<2 dB change)
Carbon Black	Pass (<0.05 dB loss)	Pass (<2 dB change)
Olive Oil	Pass (<0.05 dB loss)	Pass (<2 dB change)
Gypsum/Buffer Gel	Pass (<0.05 dB loss)	Pass (<2 dB change)
Gypsum/10W30 Oil	Pass (<0.05 dB loss)	Pass (<2 dB change)

[1] *Tested using methods from Telcordia GR-2923-CORE, "Generic Requirements for Fiber Optic Connector Cleaning Products."*

Compatibility:

AquaKleen™ Fiber Cleaner is compatible with most common plastics and rubbers.

Polycarbonate:
Injection-molded plaques of polycarbonate are cut into bars, 2½ inch by ½ inch. Samples are bent in a three-point fixture. Percent strain is calculated based on the bar thickness and the radius of curvature.

"Strain limit" is the greatest percent strain where no stress cracking occurs. A strain limit greater than 0.5% indicates strain resistance.

Strain Limit > 0.7%

AquaKleen™ Fiber Cleaner shows good compatibility with polycarbonate.

Cladding:
Fiber cladding (Corning Cable) is firmly wiped 5 times with a cleaner-saturated towel. Towel and cable are visually inspected for cladding transfer or damage.

Cladding shows no visible damage.

AquaKleen™ Fiber Cleaner shows good compatibility with fiber cladding.

Soak Testing:
Materials are immersed in AquaKleen™ Fiber Cleaner for 72 hours at 50°C (122°F). Rubbers may swell slightly, but will return to their original state once the cleaner evaporates.

Plastic	Compatibility
Acrylic	Excellent
ABS	Excellent
Nylon 66	Excellent
Polycarbonate	Excellent
Polyethylene (HDPE)	Excellent
Polyethylene (LDPE)	Excellent
PVC	Excellent

Rubber	Compatibility
Silicone Rubber	Excellent
EPDM	Excellent

Usage Directions:

AquaKleen™ Fiber Cleaner is best used with the combination wet - dry cleaning procedure recommended in Telcordia GR-2923-CORE. Microfiber towels (DT-D175) and holder (FC-HOLDER), available from American Polywater Corporation work well with this method.

Several drops or a light spray of cleaner is placed on the towel. Preferred cleaning motion is a straight line motion, drawing the endface through the wetted portion of the towel, and then through a clean portion of a second dry towel. Use of the FC-HOLDER optimizes the cleaning process. Swabs may be dampened on the wetted portion of the towel in order to clean the bulkhead or equipment.

Application Properties:

Temperature Use Range:
20°F to 120°F (-5°C to 50°C)

Storage and Shelf Life:
Keep containers tightly closed when not in use. Shelf life is 2 years.

Packaging:

AquaKleen™ Fiber Cleaner is packaged in safety sealed containers that resist spills, leaks and contamination. The 2-fluid-ounce spray and dropper bottles have over 500 uses.

Microfiber Towels:
FiberKleen™ Dry Towels offer high absorbency and are made from non-linting, non-fraying, ultra-clean material. This specialty, microfiber fabric is engineered for optimum particle entrapment. The durable towel has a smooth surface for easy cleaning. It meets Telcordia Specification.

Convenient Kit Packaging and Cleaning Accessories

Model Specification:

The statement below may be inserted into a customer specification to help maintain engineering standards and ensure work integrity.

The fiber cleaner shall be effective on both ionic and non-ionic soils. It shall meet the cleaning criteria of Telcordia GR 2923-CORE, "Generic Requirements for Fiber Optic Connector Cleaning Products." It shall contain an oxygenated solvent component for static dissipation.

The cleaner shall leave minimal residue of less than 100 ppm. It shall be compatible with fiber optic components. It shall not stress crack polycarbonate and shall have a strain limit greater than 0.5%.

The cleaner shall be water-based with low toxicity and low environmental impact. It shall have a volatile organic content (VOC) less than 100 grams/liter. It shall not contain any global warming compounds and have no ozone depletion potential.

Order Information:

Cat #	Package Description
AQ-2LP	2-oz AquaKleen™ Fiber Cleaner Finger Sprayer
AQ-2DR	2-oz AquaKleen™ Fiber Cleaner Squeeze Bottle Dropper
AQ-KIT2	AquaKleen™ Fiber Cleaner Kit: 2 AQ-2LP 1 DT-D175 1 SWB-250F100
AQ-KIT3	AquaKleen™ Fiber Cleaner Kit: 2 AQ-2DR 1 DT-D175 1 SWB-250F100
DT-D175	175 microfiber towels in a sealed plastic dispenser pack with cleaning pad
SWB-250F100	2.5 mm FiberKleen™ foam swab (100 pack)
SWB-125F10	1.25 mm FiberKleen™ foam swab (10 pack)
SWB-C100	FiberKleen™ cotton swab (100 pack)
SWB-V100	V Groove FiberKleen™ foam swab (100 pack)
SWB-M100	Mirror FiberKleen™ foam swab (100 pack)

Lit-AQTECHSPEC/REV002

Makers of Polywater® and Dyna-Blue® Cable Lubricants and Pull-Planner™ Software

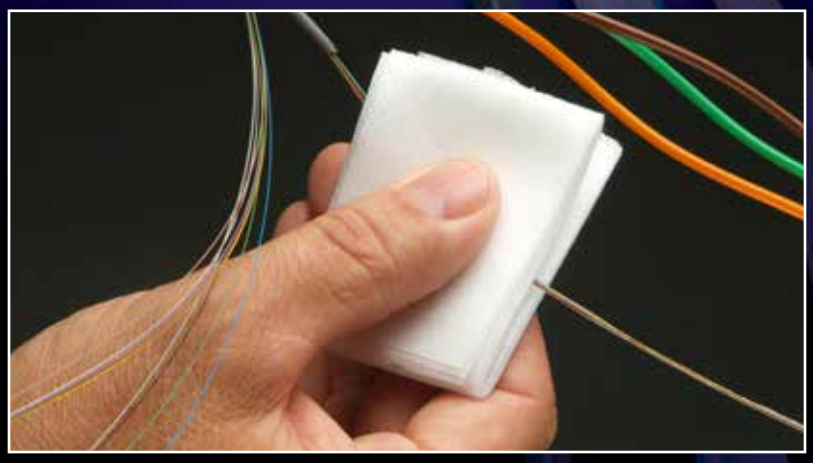
American Polywater® Corporation

11222 60th St N
Stillwater, MN 55082
U.S.A
1-800-328-9384
1-651-430-2270
http://www.polywater.com(URL) support@polywater.com(e-mail)

Polywater® SqueekyKleen™

CABLE CLEANER

- Removes pik without alcohol
- Minimal wiping (2 wipes only)
- No residue
- Safe to use on ribbon fiber
- Fans fiber quickly
- Fibers so clean they ***squeak!***



polywater.com/squeekykleen.asp

Polywater® SqueekyKleen™ Cable Cleaner

New **SqueekyKleen™** cleans and fans fiber in two wipes without alcohol, saving time and money. Hear the difference! No follow-up with alcohol required to get fibers squeaky clean and separated for fast and easy splicing. **SqueekyKleen™** reduces chemical odors and harmful vapor concentrations in splice trailers and vaults while being less harsh on hands.

SqueekyKleen's unique formulation and specially designed high-performance towelette work to remove pik from the entire surface of loose tube or ribbon fibers, leaving no residue.

SqueekyKleen™ helps keep splice equipment clean for better fiber alignment and splice quality. Will not harm acrylate on loose tube cable or Mylar® on ribbon fiber.

SPECIFICATIONS

Cleaning: When wiping a 3-foot section of 12-count fiber from a buffer tube, the pre-saturated towel will squeak and fan fibers with 2 wipes.

Solvency Power: At 68° F (20° C), will dissolve .020" (.5mm) film of PE/PJ or ETPR grease completely from cable jacket with less than two minutes of vigorous agitation (no wiping).

Residue: When placed on a clean glass panel and dried, the solvent shall leave less than 100 parts per million of residue (<100 ppm).

Water Content: When tested by the ASTM 1533B method, water content shall be less than 75 ppm.

Flash Point: When tested via a Pensky-Martin Closed Cup Test (ASTM D93), the cleaner shall have a flash point above 140° F (60° C).

CATALOG NUMBER	DESCRIPTION	STANDARD SHIPPING PACKAGE
TC-1	**SqueekyKleen™** Telcom Cleaner–Saturated 8" x 12" (20 cm X 30 cm) Wipe	144
TC-16LF	16-Oz (0.47 Liter) **SqueekyKleen™** Telcom Cleaner w/Flip Top cap	12
TC-16LR	16-Oz (0.47 Liter) **SqueekyKleen™** Telcom Cleaner w/Sprayer	12
TC-35LF	Qt (0.95 Liter) **SqueekyKleen™** Telcom Cleaner w/Flip Top cap	12
TC-35LR	Qt (0.95 Liter) **SqueekyKleen™** Telcom Cleaner w/Sprayer	12
TC-128	1-Gal (3.8 Liter) **SqueekyKleen™** Telcom Cleaner	4
TC-384	3-Gal (11.4 Liter) **SqueekyKleen™** Telcom Cleaner (5-gal pail)	1
TC-640	5-Gal (19 Liter) **SqueekyKleen™** Telcom Cleaner	1
TC-96	3-Qt (2.84 Liter) **SqueekyKleen™** Telcom Cleaner (1-gal pail)	4
TC-D300	**SqueekyKleen™** Saturated 6" x 5" (15 cm X 13 cm) Wipe Canister 55-Gal	6
TC-DRUM	Drum **SqueekyKleen™** Telcom Cleaner	1
TC-1D42	42 TC-1 in a Dispenser Pack	1

American Polywater® Corporation

1-800-328-9384
1-651-430-2270
fax 1-651-430-3634
support@polywater.com (e-mail)

LIT-TCFLYER/REV000

polywater.com/squeekykleen.asp

SqueekyKleen™
Cable Gel Remover

American Polywater® Corporation

TECHNICAL DATA SHEET

Description:

SqueekyKleen™ Cable Gel Remover effectively cleans filling gels and flooding compounds from fiber optic cables. Designed to quickly solubilize a wide range of gel types, SqueekyKleen™ results in quick and time-saving gel removal from buffer tubes, ribbon cable, and individual fibers. It easily removes flooding compounds from coaxial cables.

In just a few wipes, SqueekyKleen™ completely removes gels and leaves fibers fanned, ready for connection. It does not leave a residue. SqueekyKleen™ is compatible with most materials and plastics including polycarbonate, acrylate coating and ribbon fiber.

SqueekyKleen™ Cable Gel Remover is safe and easy to use. It lasts longer than fast evaporating alcohol and is ideal for gel removal. SqueekyKleen™ emits no dangerous vapors. With a high flash point, it is safe to transport. SqueekyKleen™ is the gel remover of choice for network and cable installers worldwide.

Cleaning Properties:

SqueekyKleen™ Cable Gel Remover dissolves a broad range of gels, filling and flooding compounds.

Property	Result
Gel Removal	Excellent (100% in less than 2 minutes)
Fiber Fan-Out	Excellent (<2 wipes to “squeak”)

Removal: A measured amount of PE/PJ or ETPR gel is spread onto a stainless steel spatula with a coating thickness of 0.5 mm. The spatula is stirred in the gel remover. The amount of gel removed is quantified by observation.

Fan-Out: A towel saturated in SqueekyKleen™ is wrapped around 12 to 18 fibers from a buffer tube. Using the thumb and forefinger to grasp the towel with firm pressure, the cable bundle is flattened and wiped clean. The fibers will fan apart when clean.

Product Benefits:

- No Alcohol Required
- Minimal Wiping
- No Residue
- Safe to Use on Ribbon Cable
- Fans Fibers Quickly
- Compatible with Most Plastics and Rubbers
- Multiple Package Options

End Use:

Removes Gels and Flooding Compounds from:

- Buffer Tubes
- Ribbon Cables
- Individual Fibers
- Coaxial Cables
- Connectors
- Splicing Tools

Physical Properties:

SqueekyKleen™ Gel Remover is a high purity solvent with low aromatic content. It does not leave a residue.

Property	Result
Flash point (ASTM D93)	>140°F (>60°C)
Initial Boiling Point	365°F (185°C)
Specific Gravity	0.79
Percent Aromatics	< 1%
Water Content (ASTM D1533B)	< 75 ppm
Evaporation Rate	Medium
Residue (ASTM D2369)	<100 ppm

Use Directions:

SqueekyKleen™ Cable Gel Remover is suitable for many types of gels and filling compounds. It cleans asphaltic or polybutene flooding compounds from coaxial cables. Use SqueekyKleen™ Remover to clean tools and work areas.

To clean and fan fibers, use the pre-moistened, SqueekyKleen™ Wipe. Do not open the towel. Start at the buffer tube and place stripped fibers into the fold of the towel. Use thumb and forefinger to flatten fibers. Press firmly on the fiber, pulling along the surface to wipe off the gel. Repeat action with a clean fold until fiber "squeaks" clean and fans. SqueekyKleen™ does not require further rinsing or cleaning with alcohol.

Safety:

SqueekyKleen™ Cable Gel Remover has a low level of toxicity and does not contain any listed carcinogens. It is combustible and should not be exposed to fire or flame. Good industrial hygiene practice and appropriate precautions should be employed during use. See MSDS for specific details.

Wipe Package Convenience

SqueekyKleen™ Cable Gel Remover pre-saturated wipes are a convenient package with multiple safety benefits.

Control
Pre-saturated wipes minimize solvent exposure on sensitive fiber optic components. Directly spraying or immersing the part allows the solvent to puddle into small openings. Wipe cleaning will also ensure that the solvent evaporates more quickly.

Safety
The pre-saturated wipe package eliminates spill hazard and limits solvent vapor exposure. Wipes contain a carefully measured quantity of solvent and are an excellent way to control vapor. SqueekyKleen™ Cable Gel Remover does not require a follow-up wipe with alcohol, further reducing vapor exposure. The wipe package is a great choice for underground or confined space applications.

Convenience
Each wipe package utilizes non-linting, non-tearing towels. Clean wipes are always available, eliminating recontamination of fibers with dirty rags or lint.

Convenient wipe package controls solvent exposure and vapor emissions

Environmental Impact:

SqueekyKleen™ Cable Gel Remover Cleaner is a safer alternative to chlorinated solvents.

Property	Result
VOC Content	790 grams/liter
Global Warming Potential	Does not contain global warming compounds
Ozone Depletion Potential	None
CFC, HCFC, HFC Content:	None
CERCLA/SARA Status	Not regulated as a hazardous substance

Compatibility:

SqueekyKleen™ Gel Remover is compatible with most components used in the communications industry. It meets standard test requirements for the various materials in which it may come in contact.

Polyethylene
SqueekyKleen™ Gel Remover is compatible with polyethylene and does not cause environmental stress cracking. [1]

Polycarbonate
SqueekyKleen™ Gel Remover is safe on polycarbonate. Polycarbonate shows chemical resistance to SqueekyKleen with a resistant strain limit of >0.9%.[2]

Corrosivity:
SqueekyKleen™ Gel Remover will not corrode or stain metal parts. It does not tarnish or corrode copper. [3]

[1] Testing based on ASTM D1693, "Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics." Polyethylene shows less than 20% stress cracking after 50°C for 14 days.

[2] Testing based on Mobay Corporation, Plastics and Rubber Division, "Chemical Compatibility Test for Unreinforced Thermoplastic Resins, 1989."

[3] Testing based on ASTM D130, "Standard Test Method for Detection of Copper Corrosion from Petroleum Products by the Copper Strip Tarnish Test."

Soak Testing:

Materials are immersed in SqueekyKleen™ Cable Gel Remover for 72 hours at 50°C (122°F). Some rubbers will swell, but should return to their original state once the cleaner evaporates. Wipe cleaning minimizes solvent exposure.

Plastics	% Weight Change	Appearance
ABS	+0.04	NC
Acrylic	-0.01	NC
Delrin®	+0.03	NC
Epoxy	0.00	NC
Nylon 66	-0.02	NC
Nylon 101	+0.07	NC
Polycarbonate	+0.04	NC
Phenolic	-0.05	NC
PPO	+0.02	NC
PVC	+0.01	NC
Teflon®	+0.03	NC
Tygon®	-0.25	NC
Ultem® 1000	-0.01	NC
Valox® 420	0.00	NC

Elastomers	% Weight Change	Appearance
Neoprene®	+9.31	SS
Nitrile	-2.01	NC
SBR	+47.34	S
Viton®	+0.07	NC

KEY:

NC = No Change
S = Swelling
ES = Extreme Softening
C = Crazing
SS = Slight Swelling
D = Disssolved

Testing based on ASTM D543, "Standard Test Method for Resistance of Plastics to Chemical Reagents."

Delrin®, Teflon®, Neoprene® and Viton® are trademarks of Du Pont. Ultem® 1000 and Valox® 420 are trademarks of G.E. Plastics. Tygon® is a trademark of Norton Performance Plastics

Model Specification:

The statement below may be inserted into a customer specification to help maintain engineering standards and ensure work integrity.

The Gel Remover solvent shall be at least 80% high purity, de-aromatized, aliphatic hydrocarbon enhanced with a cyclic terpene. Aromatic content shall be less than 1%. There should be no surfactants used in the Gel Remover and the residue shall be less than 100 ppm.

The Gel Remover shall dissolve a .020" (.5mm) film of PE/PJ or ETPR grease with less than two minutes of agitation. When wiping a 2-foot section of 24 count fiber from a buffer tube, a towel pre-saturated with the Gel Remover shall "squeak" the fibers with 3 wipes or less. The Gel Remover shall be compatible with materials typical to the communications industry.

The Gel Remover shall be safe to use. It shall have a flash point greater than 140°F (60°C). The Gel Remover shall not be a carcinogen or listed by CERCLA as a hazardous waste.

Order Information:

Cat #	Package Description
TC-1	Single, saturated wipe 144/case
TC-1D42	42 TC-1 in a dispenser pack
TC-16LF	1-pint bottle with flip top (480 ml) 12/case
TC-16LR	1-pint bottle with sprayer (480 ml) 12/case
TC-35LF	1-quart bottle with flip top (95 ml) 12/case
TC-35LR	1-quart bottle with 6 sprayers (95 ml) 12/case
TC-128	1-gallon jug (3.8 l) 4/case
TC-384	3 gallons in 5-gallon pail (11.6 liter)
TC-640	5-gallon pail (18.0 liter)
TC-96	3-quarts in a 1-gallon pail (2.85 liter)
TC-D300	Dispenser w/300 5"X6" (16 cm X 13 cm) Pre-moistened wipes
TC-DRUM	55-gallon drum (210 liter)

Makers of Polywater® and Dyna-Blue® Cable Lubricants and Pull-Planner™ Software

American Polywater® Corporation

11222 60TH St. N
Stillwater, MN 55082
U.S.A

1-800-328-9384
1-651-430-2270
http://www.polywater.com(URL) support@polyhwater.com (e-mail)

Type FO™

Anhydrous Isopropyl Alcohol

- **99.8% Anhydrous Isopropyl Alcohol**
- **Excellent Solvency**
- **No Residue**
- **Fast Evaporating**
- **Non-Abrasive**
- **Convenient Packages**

Type FO™ Anhydrous Isopropyl Alcohol has essentially no water content. Type FO™ is great for cleaning fiber optics and associated equipment. It quickly removes dust, oils, and contaminants, while leaving no residue.

Type FO™ is available in convenient pre-saturated towelettes which are convenient for field use and eliminate spill hazards and vapor exposure. Towelettes are durable and non-linting.

Bulk packages available including a 2 oz. spray bottle and larger packages described below.

Catalog #	Description	Units per case
FO-1	5” x 8” Saturated Towelette	50
FO-2LP	2 oz Refillable Spray Bottle	12
FO-8LF	8 oz Refillable Bottle w/Flip top	12
FO-16	16 oz Bottle	12
FO-32	32 oz Bottle	12
FO-128	1 gal Jug	4

Important Notice: The statements here are made in good faith based on tests and observations we believe to be reliable. However, the completeness and accuracy of the information is not guaranteed. Before using, the end-user should conduct whatever evaluations are necessary to determine that the product is suitable for the intended use.

American Polywater expressly disclaims any implied warranties and conditions of merchantability and fitness for a particular purpose. American Polywater's only obligation shall be to replace such quantity of the product proven to be defective. Except for the replacement remedy, American Polywater shall not be liable for any loss, injury, or direct, indirect, or consequential damages resulting from product's use, regardless of the legal theory asserted.

American Polywater® Corporation
11222 60th St. N.
Stillwater, MN 55082
U.S.A
1-800-328-9384
www.polywater.com 1-651-430-2270
support@polywater.com fax 1-651-430-3634

LIT-FOFLYER/REV000

www.polywater.com/typefo.asp

Unique

HydraSol®

Cable Gel Remover

Safe, Effective, Water-based Cleaner For the Removal of Cable Filling Greases

- **Maximum Solvency Power on PE/PJ or ETPR Greases**
- **No Chlorinated Solvent, CFC, or Glycol Ether Content**
- **Rinses Off With Water--Water Base**
- **Good for Multiple Cleanings**
- **Available in a Variety of Convenient Packages**

HydraSol® Cable Gel Remover

HydraSol® Gel Remover is a water-based solvent cleaner that offers unique safety and handling. HydraSol® Gel Remover is amazingly effective at dissolving and removing cable filling greases (ickypic).

HydraSol® Remover's components are on the FDA's and FEMA's "generally recognized as safe," lists. They have low toxicity whether by oral, inhalation or dermal exposure. The product is water-based (over 50% water).

HydraSol® Remover softens, removes and suspends cable filling greases. The solvent remains active and is only slowly "used up." HydraSol® Remover is good for multiple cleaning for economy and efficiency.

HydraSol® Remover is easy to rinse off hands and tools. Dissolved grease isn't "redeposited" as the cleaner residue dries.

★ Unique Flip-top and Spray Bottles - HydraSol® Gel Remover is available in environmentally safe, refillable, flip-top cap and trigger spray bottles (adjustable for stream or spray).

Package Size	Product Number
55 gallon drum (208 l)	HS-Drum
5 gallon pail (18.9 l)	HS-640
3 gallons (11.3 l) in a 5-gal. pail	HS-384
1 gallon (3.8 l) jug (4/cs)	HS-128
3 quarts (2.8 l) in a 1-gal pail (4/cs)	HS-96
1 quart (.95l) bottle (12/cs)	HS-32
★ 32 oz. (.95 l) spray bottle (12/cs)	HS-32LR
★ 16 oz. (475 ml) trigger spray btl (12cs)	HS-16LR
★★Saturated towelette/foil pack (144/cs)	HS-1
72-Ct Saturated Wipe Dispenser (6/cs)	HS-D72

★★ Durable Saturated Wipe – HydraSol® Remover is available in a presoaked towelette. The large, tear-resistant towelette comes in an easy-open foil pack. The towelette is especially effective for smaller cleaning jobs and fiber optic splicing. Saves money over bulk use with rags.

SPECIFICATIONS

1. **Solvency Power:** At 68°F (20°C), will dissolve > 80% of .020" (.5 mm) film of PE/PJ or ETPR grease from cable jacket with less than two minutes of vigorous agitation (no wiping).
2. **Water Base:** Greater than 50% water content.
3. **Appearance:** Milky-white liquid. Requires shaking before use.
4. **Percent Non-volatile:** Less than 3%
5. **Chlorinated Solvent, CFC, or Glycol Ether Content:** None
6. **Clean-up:** Can be rinsed off with water.
7. **Combustibility:** Will self-extinguish in under five seconds when wicked onto 00 steel wool and ignited.

View the HydraSol® flyer online at http://www.polywater.com/hydrasol.html

American Polywater® Corporation

11222 60th. St. N.
Stillwater, MN
55082 U.S.A.

1-800-328-9384
support@polywater.com (e-mail) 1-651-430-2270
http://www.polywater.com(URL) fax 1-651-430-3634

LIT-HSFLYER/REV000

CableKleen™

Flooding Compound Remover

CableKleen™ CATV Cleaner effectively cleans flooding compounds from coaxial cables and tools. Designed to quickly remove a wide range of flooding compounds and gel types, CableKleen™ CATV Cleaner results in quick and time-saving removal of flooding compounds from cables and tools.

- **Excellent Coaxial Flooding Compound Remover**
- **Cleans Tools Fast**
- **Minimal Wiping**
- **No Residue**
- **Compatible with Most Plastics and Rubbers**
- **Multiple Package Options**

Catalog #	Description	Case Qty
CK-35LF	1-qt bottle with flip-top cap	12
CK-128	1-gal (3.8 liters) jug	4
CK-640	5-gal (18.9 liters) pail	1
CK-DRUM	55-gal (208 liters) drum	1
CK-D72	72-count canister	6
CK-D300	dispenser w/300 5”x6” premoisted wipes	6

American Polywater® Corporation

phone:1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
e-mail: support@polywater.com

www.polywater.com/cablekleen.asp

POLYWATER® PE FUSION TOWELETTES

EFW-1 alcohol towelette

Polywater® EFW-1 is a 99.8% pure anhydrous isopropyl alcohol wipe containing the highest alcohol content in the pipeline industries. This ensures zero residue prior to making pipe connections. Use Polywater® EFW wipes for electro or butt fusion splices prior to shaving the pipe to clean off the oxidation layer. The EFW-1 can be used to prepare or clean mud or dirt from elbows, T's, saddles, MET fittings, pipe shavers, or any PE fusion application that requires a cleaning wipe.

Isopropyl alcohol naturally absorbs moisture from the air. Water content in isopropyl leads to poor fusion results. Bulk containers are especially problematic as packages are reopened and diluted by water. The presaturated EFW-1 is sealed until single use, eliminating water absorption.

- 99.8% pure anhydrous alcohol
- Presaturated, lint-free 5" x 8" towelette
- Great for cold weather applications

ACE-1L acetone towelette

Polywater® ACE-1L is an acetone wipe, which makes it ideal for use in strict VOC regulatory environments where isopropyl alcohol cannot be used. The wipe offers excellent cleaning power and leaves no residue.

- Zero VOC's - 100% Acetone
- Larger presaturated lint-free 10" x 12" towelette
- Great for cold weather applications

Catalog #	Description	Units/Case
EFW-1	Saturated 5" x 8" wipe in sealed pouch	50 per case
ACE-1L	Saturated 10" x 12" wipe in sealed pouch	100 per case

To view technical information on our website go to:
Support Page: www.polywater.com/EFW.asp
Lubricant Application Videos: www.polywater.com/videos.asp

American Polywater® Corporation

phone: 1-800-328-9384
1-651-430-2270
fax: 1-651-430-3634
email: support@polywater.com
11222 60th Street North, Stillwater, MN 55082, U.S.A.

ADHESIVES | **CLEANERS** | LUBRICANTS | SEALANTS WWW.POLYWATER.COM

LIT-EFWACEFLYER/REV000

Training & Demonstration Videos

No Registration Required!

Link to English Language Flyer for additional information	VIDEO FORMAT* Click to View Online	YouTube	Image
AirRepair® Pressurized Cable Leak Repair System Run Time 10:52	WMV		
BonDuit® Conduit Adhesive -- Application Instructions Run Time 6:09	WMV		
Cable Installation Engineering -- For Engineers & Consultants Run Time 13:27	WMV		
Cable Pulling & Lubrication -- For Fiber Optic Cable Run Time 12:24	WMV		
Cable Pulling Lubrication -- For HV Electrical Cable Run Time 8:42	WMV		
Electrical Cable Cleaning -- For HV Electrical Splicing Run Time 7:58	WMV		
Front End Pack™ Bag Lubrication System Run Time 3:30	WMV		
FST-250 Foam Duct Sealant -- Video demonstrates use of the product the in a clear conduit for easy visualization Run Time 6:12	WMV		
FST-250 Foam Duct Sealant -- Video demonstrates use of the product using the saturated foam method of installation Run Time 4:37	WMV	YouTube	
FST-250 Foam Duct Sealant -- Video demonstrates use of the product using the saturated foam method of installation in running water. Run Time 3:12	WMV	YouTube	
FST-250 Foam Duct Sealant -- Video demonstrates use of the product in a 4-inch conduit. Run Time 3:02	WMV	YouTube	

FST-250 Foam Duct Sealant -- Video demonstrates use of the product using the saturated foam method of installation in a U Guard Run Time 1:57	WMV	YouTube	
FST-MINI Foam Duct Sealant -- Video demonstrates use of the product Run Time 2:36	WMV	YouTube	
IceFree™ Antifreeze Gel System Run Time 5:32	WMV		
InstaGrout™ Sealant Barrier Run Time 8:40		YouTube	
Lubricant Application -- Pumps & Applicators **Video demonstrates the use of pumps to apply Polywater® Lubricant** Run Time 4:30	WMV		
Lubricant Application -- Hand Applying Lubricate **Video demonstrates hand applying Polywater® Lubricant** Run Time 4:21	WMV		
Lubricant Application -- Spray Application **Video demonstrates the use of Polywater® Spray Lubricant** Run Time 2:54	WMV		
Lubricant Application -- Front End Pack™ **Video demonstrates the use of the Polywater® Front End Pack™** Run Time 3:30	WMV		
Pull-Planner™ 3000 for Windows™ **Video demonstrates the use of the Pull-Planner™ 3000 for Windows™ software** Run Time 1Hour 24 Minutes * You may need to install codec from GoToMeeting to view the video.	WMV*	YouTube	
Polywater Flame Resistance Video demonstrates combustion resistance of Polywater® Lubricant J and LZ residues in conduit Run Time 0:10	MPG		
Polywater® SPY Spray Lubricant -- The "Pull-O-Rama" Demonstration Run Time 4:18	WMV		
PowerPatch® Transformer Leak Repair System Run Time 4:13		YouTube	
PowerPatch® Pad N Pole™		YouTube	

Run Time 2:02			
Pump Model LP-3™ Hand-Operated 5-Gallon-Pail Lubricant Pump Run Time 0:15	MPG		
QuicKleen™ Fiber Cleaner Run Time 2:54	WMV		
RBG™ Rubber Goods Cleaner for Live-Line Tools Run Time 3:32	WMV		
SolidSeal™ Duct Sealant Run Time 2:26	WMV	YouTube	
Splice Shield™ Cable repair sealant **Run Time 1:38**		YouTube	
Sprayer Model IS-3 Hand-Pump Sprayer for Polywater® SPY Lubricant Run Time 1:00	WMV		
SqueekyKleen™ Communications Cleaner for Fiber Optic Cables Run Time 2:09	WMV		
SqueekyKleen™ Communications Cleaner for Fiber Optic Cables Run Time 3:05 (in CHINESE)	WMV		
Type HP™ Multi-Purpose Cleaner -- Video demonstrates cable cleaning and other electrical uses. Run Time 5:17 (in CHINESE)	WMV		
Type P7™ Penetrating Oil Run Time 1:33 (in CHINESE)	WMV	YouTube	
Type P7™ Penetrating Oil Protects Run Time 0:41	WMV	YouTube	
Type P7™ Penetrating Oil Loosens Run Time 0:38	WMV	YouTube	
Type P7™ Penetrating Oil Lubricates Run Time 0:31	WMV	YouTube	
Type TR™ Trichlor Replacement Wipes & Aerosols Run Time 3:55 (in CHINESE)	WMV		
UPR™ Utility Pole Repair Run Time 5:01	WMV	YouTube	
UPR™ Utility Pole Repair (No Flow)			

Run Time 1:47	WMV	YouTube	
Wax Lubricant Residue Flammability Video demonstrates combustibility of wax-based lubricant residue in split conduit Run Time 0:31	MPG		

* Higher resolution versions of these videos are included with American Polywater's full-line catalog on CD. To request a catalog CD, complete this Mail List Application Form and be sure to click the "Full-Line Product Catalog" button near the bottom of the page. Note that subscription to newsletters is not required. You can also contact American Polywater at 1-800-328-9384 or 1-651-430-2270, or email a catalog request to support@polywater.com. Be sure to include full contact information.

ARRA Buy American Compliant

MadeInAmerica.com Listed

FTC Made In America Qualified

NAED Associate Member

Home | About | Site Map | Literature | Samples | Links | Reps | Videos | Pumps | RFQ
Codes | Engineering | Shows | Spotlight | Newsletters | MSDS | Translations | Contacts | Jobs

P.O. Box 53 | Stillwater, MN 55082 USA
1-(651) 430-2270 (Voice) | 1-(651) 430-3634 (Fax)
1-(800) 328-9384 (Toll-Free US/Canada Only)

Material Safety Data Sheets

Polywater® Product Flyers	Catalog Prefix	English MSDS	Fran&#65533;ais MSDS
AirRepair® Sealant Part A	AR	Yes	--
AirRepair® Sealant Part B	AR	Yes	--
AirRepair® Sealant Primer	AR	Yes	--
AirRepair® Sealant Putty	AR	Yes	--
AquaKleen® Fiber Cleaner	AQ	Yes	--
BonDuit® Conduit Adhesive Kit	BT	Yes	--
BonDuit® Adhesive Part A only	BT	Yes	--
BonDuit® Adhesive Part B only	BT	Yes	--
Boom™ Prewash Wipes (cat #B-1 & B-D72)	B	Yes	--
Boom™ Wash Concentrate	BWC	Yes	--
CableFree® Loosener	CF	Yes	--
CableKleen™ Flooding Compound Remover	CK	Yes	--
CableWash™ Solution	CWS	Yes	--
Dyna-Blue® Cable Pulling Lubricant	D	Yes	Yes
FST™ Foam Sealant Kit	FST	Yes	--
FST™ Foam Sealant Part A	FST	Yes	--
FST™ Foam Sealant Part B	FST	Yes	--
GrandSlam™ Pipe Joint Lubricant	GSQ	Yes	--
GrandSlam™ Wintergrade Lubricant	GWQ	Yes	--
Grime-Away™ Cleaning Wipes	HTC	Yes	--
HydraSol® Remover Bulk Packages	HS	Yes	Yes
HydraSol® Remover Wipes (cat #HS-1)	HS	Yes	Yes
HydraSol® Remover Canister (cat #HS-D72)	HS	Yes	Yes
IceFree™ Antifreeze Gel System	WS	Yes	--
InstaGrout™ Sealant Barrier	PMT	Yes	--
Network Loop™ Cable Pulling Lubricant	NL	Yes	--
Packing Installation Lubricant	PL	Yes	--
PedFloor™ Structural Foam Sealant Barrier	PF	Yes	--
Polywater® A Cable Pulling Lubricant	A	Yes	--
Polywater® CLR Cable Pulling Lubricant	CLR	Yes	Yes

Polywater® F Cable Pulling Lubricant	F	Yes	Yes
Polywater® FTTx Cable Pulling Lubricant	FTTx	Yes	Yes
Polywater® G Cable Pulling Lubricant	G	Yes	Yes
Polywater® J Cable Pulling Lubricant	J	Yes	Yes
Polywater® LZ Cable Pulling Lubricant	LZ	Yes	Yes
Polywater® NB Cable Pulling Lubricant	NB	Yes	--
Polywater® NN Cable Pulling Lubricant	NN	Yes	--
Polywater® PJ Cable Pulling Lubricant	PJ	Yes	--
Polywater® PR Power Cable Lubricant	PR	Yes	--
Polywater® SPY Cable Pulling Lubricant	SPY	Yes	--
Polywater® WF Cable Pulling Lubricant	WF	Yes	--
Polywater® WJ Cable Pulling Lubricant	WJ	Yes	Yes
Polywater® WLZ Cable Pulling Lubricant	WLZ	Yes	--
Polywater® WNB Cable Pulling Lubricant	WNB	Yes	--
Polywater® WNN Cable Pulling Lubricant	WNN	Yes	--
Polywater® WPJ Cable Pulling Lubricant	WPJ	Yes	--
Polywater® WSPY Cable Pulling Lubricant	WSPY	Yes	--
PowerPatch® Pad N Pole™ Repair	BRK	Yes	--
PowerPatch® EP-KIT	EP	Yes	--
PowerPatch® Sealant Part A	EP	Yes	--
PowerPatch® Sealant Part B	EP	Yes	--
PowerPatch® Sealant Primer	EP	Yes	--
PowerPatch® Sealant Putty	EP	Yes	--
PowerPatch® Sealant cartridge KIT	EPCT	Yes	--
PowerPatch® Sealant Part A in cartridge	EPCT	Yes	--
PowerPatch® Sealant Part B in cartridge	EPCT	Yes	--
Prelube™ 2000 Cable Blowing Lubricant	P	Yes	Yes
Prelube™ 2000 Wintergrade Lubricant	WP	Yes	--
Prelube™ 5000 Microcable Blowing Lubricant	PM	Yes	--
Premise Loop™ Cable Pulling Lubricant	RL	Yes	--
QuicKleen™ Fiber Cleaner	QC	Yes	--
RBG™ Rubber Goods Cleaner	RBG	Yes	Yes
S-1™ Hot Stick Wipes	S	Yes	--
SolidSeal™ Duct Plug	SDP	Yes	--
SqueekyKleen™ Telcom Cleaner (Bulk Packages)	TC	Yes	Yes
SqueekyKleen™ Telcom Cleaner (Wipe Packages)	TC	Yes	Yes
Type CG™ Cold Galvanizing (cat #CG-13)	CG	Yes	--
Type FD™ Cleaner Aerosol (cat #FD-9)	FD	Yes	--
Type FD™ Cleaner Bulk Packages	FD	Yes	--

Type FO™ Cleaner Bulk Packages	FO	Yes	--
Type FO™ Cleaner Wipes (cat #FO-1)	FO	Yes	--
Type GP™ Cleaner Bulk Packages	GP	Yes	--
Type GP™ Cleaner Wipes	GP	Yes	--
Type HP™ Cleaner Aerosol (cat #HPY-12)	HPY	Yes	--
Type HP™ Cleaner Bulk Packages	HP	Yes	Yes
Type HP™ Cleaner Saturated Wipes	HP	Yes	Yes
Type HP™ Cleaner Canister (cat #HP-D72)	HP	Yes	Yes
Type KC™ Cleaner Aerosol (cat #KC-4 & KC-16)	KC	Yes	--
Type NF™ Cleaner Wipes	NF	Yes	--
Type P7™ Penetrating Oil (cat #P7-12)	P7	Yes	--
Type TR™ Cleaner Aerosol (cat #TR-16)	TR	Yes	--
Type TR™ Cleaner Wipes	TR	Yes	--
W-1™ Wax & Buff Wipes	W	Yes	--
W-16™ Fiberglass Wax	W	Yes	--

Only our most frequently requested material safety data sheets are listed above. Call Customer Service at (800) 328-9384 if you need one that is not listed.

Click here to Add Your Name To Our Mail List

ARRA Buy American Compliant

MadeInAmerica.com Listed

FTC Made In America Qualified

NAED Associate Member

Home | About | Site Map | Literature | Samples | Links | Reps | Videos | Pumps | RFQ
Codes | Engineering | Shows | Spotlight | Newsletters | MSDS | Translations | Contacts | Jobs

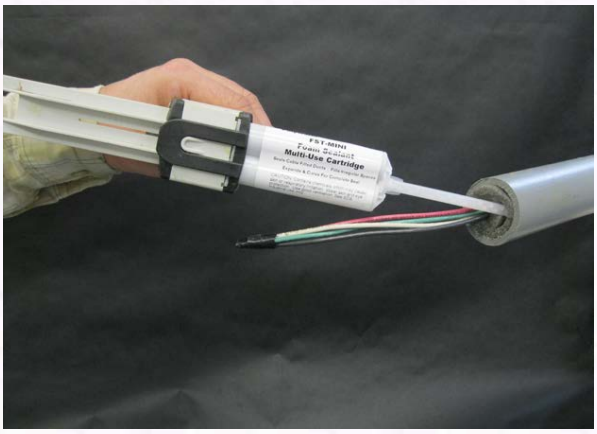
American Polywater Corporation
P.O. Box 53 | Stillwater, MN 55082 USA
1-(651) 430-2270 (Voice) | 1-(651) 430-3634 (Fax)
1-(800) 328-9384 (Toll-Free US/Canada Only)

American Polywater's
Foam Sealant (FST) Quantity Calculation Page

Introduction: This page will estimate the quantity of two-part FST liquid required to seal a conduit or multiple conduits. Polywater's FST ™ Duct Seal expands and hardens to a closed-cell foam. The foam seal keeps water, gases, acids, greases, insects and rodents out of the conduit. The calculator determines the amount of liquid base required.

The FST-250 caulking tube package has centimeter (cm) markings on the label and the recommended use quantity is in cm. A full FST-250 caulk-style tube contains 8.6 cms of liquid base. The FST-MINI uses a specialty application tool. Each cartridge contains 20 squirts of liquid base. Recommended use quantity is given in number of squirts.

FST-250 Caulk-style Tube
for Large Ducts



FST-MINI 50mL Dual Cartridge
for Small Ducts

Data Entry: The data input is straight forward. Select duct size, FST package style, and the number of ducts. The calculation provides a target quantity for each conduit followed by the total number of packages needed for the whole job. See www.polywater.com/FSTuse.pdf or www.polywater.com/FSTMINIuse.pdf for installation instructions. For more detailed job planning or questions, please contact customer service at 800-328-9384.

Fill in All Fields Below and then click Calculate

Conduit Size

- ○ 1/2 Inch (13mm)
- ◉ 3/4 Inch (19mm)
- ○ 1 Inch (25mm)
- ○ 1 1/4 Inch (32mm)

FST Package

- ○ FST-MINI

Number of Conduits

2

○1 1/2 Inch (38mm)

○2 Inch (51mm)
○3 Inch (76mm)
○4 Inch (102mm)
○5 Inch (127mm)
○6 Inch (152mm)
○8 Inch (203mm)

○FST-250KIT

Calculate Clear

Each Conduit Requires **1 squirt(s).**
Job Requires **1** FST-MINI-1(s). (based on **20%** cable fill)

Each Conduit Requires **2 squirt(s).**
Job Requires **1** FST-MINI-1(s). (based on **0%** cable fill)

Contact your local distributor or American Polywater to order.

ARRA Buy American Compliant

MadeInAmerica.com Listed

FTC Made In America Qualified

NAED Associate Member

P.O. Box 53 | Stillwater, MN 55082 USA
1-(651) 430-2270 (Voice) | 1-(651) 430-3634 (Fax)
1-(800) 328-9384 (Toll-Free US/Canada Only)