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TECHNICAL DATA SHEET
POLYWATER® POWERPATCH® LEAK REPAIR

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DESCRIPTION

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

PowerPatch repairs active leaks with a two-part putty followed by a strong, durable sealant. PowerPatch provides permanent protection for essential electrical grid assets.

PowerPatch is a field-ready system and includes all the materials required to seal electrical insulating oil and gas leaks. It bonds to polyethylene, lead, aluminum, ceramic, and steel.

LEAK SEALING PERFORMANCE

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

MATERIAL	PRESSURE	RESULT
Steel	200 psi (1.4 MPa)	No leaks
HDPE	35 psi (0.24 MPa)	No leaks
Lead	50 psi (0.35 MPa)	No leaks

To test oil sealing, a 1/16-inch hole in a galvanized steel pipe filled with oil was patched. The surface was prepared, and sealant was applied and cured according to the instructions. The oil-filled pipe was then subjected to continuous air pressure.

CONTINUOUS PRESSURE	RESULT
Polybutene oil, 100 psi (0.69 MPa) one month	No leaks

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

PowerPatch provides a fast and easy in-field repair system.

PRODUCT FEATURES

- **Fast Repair:** Stops active leaks without shutting down equipment.
- **Convenient:** Seals active leaks in minutes. Also eliminates “bagging” of transformers during transit.
- **Resilient:** Seal is UV and weather resistant for long-term durability.
- **High Adhesion:** Adheres to numerous types of metals, porcelain, and rubber materials.

  Chemically Inert: Will not affect oils, solid insulation, or other equipment.

END USE

PowerPatch Sealant repairs oil and SF_6 leaks and restores electrical integrity to:

- Transformers
- Switchgear
- Terminations
- PILC Cables

COMPONENT PHYSICAL PROPERTIES

PowerPatch Sealant is a 2-part thick gel, sold ready to mix and use.

PROPERTY	PART A	PART B
Color	Black	White
Form	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. Sealant has excellent strength and adhesion as described below.

PROPERTY	RESULT
Color	Dark grey
Peak exotherm @ 70°F/20°C	<200°F (<95°C)
Hardness 7 days @ 70°F/20°C (Shore D Durometer)	79-89
Flexural stress (ASTM D790)	6,925 lb_f/in^2 (47.7 MPa)
Flexural strain (ASTM D790)	1.43 x 10^{-2} in/in (mm/mm)

TYPICAL T-PEEL STRENGTH

SUBSTRATE	RESULT
Galvanized steel	34.0 pli (6.0 N/mm)
Copper	21.4 pli (3.7 N/mm)
Lead	15 pli (2.6 N/mm)

Tested using ASTM D1876. Samples are sanded, cleaned, and allowed to cure for 7 days.

TYPICAL SHEAR STRENGTH

SUBSTRATE	RESULT
Steel	850 lb/in^2 (5.9 N/mm^2)
Stainless steel	880 lb/in^2 (6.0 N/mm^2)
Aluminum	650 lb/in^2 (4.5 N/mm^2)
Polyethylene	120 lb/in^2 (0.79 N/mm^2)
PVC	150 lb/in^2 (1.0 N/mm^2)
Copper	1,200 lb/in^2 (8.3 N/mm^2)

Tested using ASTM D1002. Samples are sanded, cleaned, and allowed to cure for 7 days.

TYPICAL IMPACT RESISTANCE

SUBSTRATE	RESULT
HDPE	15 $ft{\cdot}lb_f/in^2$ (31 kJ/m^2)
Lead	36 $ft{\cdot}lb_f/in^2$ (76 kJ/m^2)
Steel	33 $ft{\cdot}lb_f/in^2$ (69 kJ/m^2)

Tested using ASTM G14. Samples are sanded, cleaned, and allowed to cure for 7 days.

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.

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. Results are the average of 10 trials.

MATERIALS COMPATIBILITY

PowerPatch is compatible with electrical insulating mineral oil.

TEST	SAMPLE OIL	CONTROL OIL
Color, ASTM 1500	L 0.5	L 0.5
Dielectric strength, ASTM D877, kV	46	41
Interfacial tension, ASTM D971, mN/m	40	43
Neutralization number, ASTM D974, mg KOH/g	<0.01	<0.01
Power factor @ 100°C, ASTM D924, %	0.236	0.480

Tested using ASTM D3455 using Ergon Hyvolt II Mineral Oil. 14 grams PowerPatch is immersed in the oil and aged for 164 hours at 100°C. Oil is tested and compared to the control sample.

This testing showed very little change in oil quality. The IFT and dielectric of the sample oil are greater than 35, the neutralization value is below 0.03, and the power factor is below 0.8%. Results are considered acceptable by industry experts.

CHEMICAL RESISTANCE

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

PowerPatch was exposed to reagent and aged at 50°C for 6 months. Adhesive strength to steel measured using ASTM D1002.

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 Use Instructions.

Each kit contains material to repair a standard leak area or seam. Below is the coverage area.

PACKAGE	COVERAGE AT ¼-IN (6 MM) DEPTH
EPCT-50 cartridge	13 x 1-inch (33 x 2.5 cm) bead
EPCT-250 cartridge	65 x 1-inch (165 x 2.5 cm) bead
EP paste	18 x 1-inch (46 x 2.5 cm) bead

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

CURE RATE

Recommended application temperature is 40°F to 120°F (4°C to 50°C). Cure rate is temperature dependent.

TEMPERATURE	WORKING TIME	FUNCTIONAL CURE
40°F (4°C)	40 minutes	7 hours
52°F (11°C)	20 minutes	3½ hours
60°F (16°C)	10 minutes	1½ hours
70°F (20°C)	6 minutes	60 minutes
90°F (32°C)	4 minutes	40 minutes

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

AGING CONDITION	RESULT
Ambient (70°F/20°C)	Holds 20 psi oil pressure after 15 minutes

The seal sets in less than 10 minutes at this temperature.

VERTICAL SAG

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

To test, PowerPatch is applied to a vertical metal surface. Displacement during cure is measured.

TEMPERATURE	DISPLACEMENT FROM CENTER
60°F (16°C)	0 inches (0 mm)
75°F (24°C)	1/16 inch (1.6 mm)
95°F (35°C)	3/32 inch (2.4 mm)
110°F (43°C)	3/16 inch (4.8 mm)

PowerPatch Paste shows minimal sag within large temperature range.

PAINT ADHERENCE

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

PAINT TYPE	RESULT
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 (4°C to 50°C)
In Use: -40°F to 300°F (-40°C to 150°C)

PowerPatch works in extreme temperatures. A seal tested to 30 psi (207 kPa) at 300°F (150°C) and then at -40°F (-40°C) held without failure.

Temperature Cycle Testing:

Ten cycles at -5°F to 120°F (-20°C to 50°C) showed no significant change in adhesion. Lap shear strength was measured after aging and compared to a non-aged control as shown below.

MATERIAL	COMPARISON TO CONTROL	RESULT
Galvanized steel	84%	Pass
Aluminum	73%	Pass
Copper	130%	Pass
Stainless steel	131%	Pass

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

PowerPatch has been environmentally aged in extreme conditions including rain, snow, sleet, direct exposure to sunlight, and a temperature range from -25°F to 110°F (-30°C to 45°C).

PowerPatch shows no deterioration and cannot be physically pried from the surface. It shows only slight discoloration (1/16 inch/1.6 mm thickness).

SAFETY

PowerPatch Sealant has a low level of toxicity. Follow good industrial hygiene practice during use. Wear gloves and safety goggles to protect skin and eyes. 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 repair active oil leaks. 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 T-peel strength of 20 pli (2.3 N-m) on stainless steel, copper, and ceramic when measured by ASTM D1876. The adhesive repair patch will retain 70% of its shear strength adhesion after 5 freeze/thaw cycles and shall withstand in-use temperatures from -40°F to 300°F (-40°C to 150°C).

The adhesive repair patch shall seal mineral oil and polybutene dielectric fluid at up to 200 psi (1380 kPa) oil pressure without leakage. It shall be compatible with insulating oil. The cured repair patch shall be impervious to water, salt water, oils, and dilute acids and bases.

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 D149.

ORDER INFORMATION

CAT #	PACKAGE DESCRIPTION
EPCT-KIT1 multi-use cartridge kit	2 – PowerPatch Sealant 2-part 50-ml cartridges 4 – Mixing Nozzles 2 – 1¾-in/4 cm Putty Stick 8 – Type RP™ Cleaning Wipes 1 – 24-in/61 cm Sanding Cloth 4 – Application Sticks 1 – Instruction Sheet
EPCT-KITB6	A box with 6 EPCT-KIT1
EPCT-KIT1G	EPCT-KIT1 with dispensing tool
EPCT-KITB6G	Case of 6 EPCT-KIT1 with dispensing tool
TOOL-50-11	Dispensing Tool
EP-KIT11	1 – 2-part PowerPatch Sealant Paste (parts A and B) 1 – 1¾-in/4 cm Putty Stick 2 – Type RP Cleaning Wipes 1 – 12-in/61 cm Sanding Cloth 2 – Mixing Sticks 1 – Pair Disposable Gloves 1 – Instruction Sheet
EP-KITB6	Case of 6 Single-use Kits, EP-KIT11
EP-KITB12	Case of 12 Single-use Kits, EP-KIT11
EP-KIT51	6 – 2-part Sealant Sets (part A & B) PowerPatch Sealant 1 – 7-in/18 cm Putty Stick 12 – Type RP Cleaning Wipes 6 – 24-in/61 cm Sanding Strips 12 – Mixing Sticks 6 – Pairs Disposable Gloves 1 – Instruction Sheet
EPCT-250KIT1	1 – PowerPatch Sealant 2-part 250-ml Cartridge 3 – Mixing Nozzles 2 – 1¾-in/4 cm Putty Stick 6 – Type RP Cleaning Wipes 1 – 24-in/61 cm Sanding Strip 3 – Application Sticks 1 – Instruction Sheet

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